CHECKLIST ENVIRONMENTAL ASSESSMENT

Project Name:	Flower Creek Timber Sale
Proposed Implementation Date:	Summer of 2008
Proponent:	Libby Unit, Department of Natural Resources and Conservation (DNRC)
Location:	Sec 16 T30N R31W (429 Acres); approximately 2 air miles southwest of Libby, MT.
County:	Lincoln

I. TYPE AND PURPOSE OF ACTION

The Montana Department of Natural Resources and Conservation (DNRC), Libby Unit, is proposing a commercial timber harvest approximately 2 air miles southwest of Libby, MT in Section 16, Township 30 North, Range 31 West (Attachment A, Vicinity Map). Under the proposed Flower Creek Timber Sale, DNRC would harvest and sell approximately 4 million board feet of wood products from 5 harvest units totaling 429 acres (352 acres of seedtree/shelterwood cut and 77 acres of a selection cut) using ground based logging equipment. As a result of this proposed timber sale, an estimated $730,000 would be generated for the Common Schools Trust. Additional actions would include the construction of 0.75 mile temporary roads that would be reclaimed at the end of the sale, the reconditioning and maintenance of 1.5 miles of existing road, and the construction of 0.75 mile of new road that would remain closed after harvest activities are complete(Attachment A, Road Development). Post timber harvest operations on 352 acres would include scarification and planting ponderosa pine and western white pine. Logging slash would be treated to meet state laws by means other than burning (i.e. chipping for hog fuel, or hauling a way the slash). Timber sale activities are likely to begin in the summer of 2008 and conclude in the year 2010. Site specific objectives for the project area are: promote historic forest stand conditions and species compositions, and control tree densities for maintaining vigorous individual tree growth and reduce susceptibility to insects, disease and fire in the project area.

Lands involved in this proposed project are held by the State of Montana in trust for the Common Schools (Enabling Act of February 22, 1889: 1972 Montana Constitution, Article X Section 11). The Board of Land Commissioners and the DNRC are required, by law, to administer these trust lands to produce the largest measure of reasonable and legitimate return over the long run for these beneficiary institutions (Section 77-1-202, MCA). The DNRC would manage lands involved in this project in accordance with the State Forest Land Management Plan (DNRC 1996), the Administrative Rules for Forest Management (ARM 36.11.401 through 450), and all other laws applicable to timber harvest activities on State lands.

II. PROJECT DEVELOPMENT

1. PUBLIC INVOLVEMENT, AGENCIES, GROUPS OR INDIVIDUALS CONTACTED:

Provide a brief chronology of the scoping and ongoing involvement for this project.

Public notices were placed in the *Western News* June, 2006. Scoping letters were sent to adjacent landowners and other interested parties on the Libby Unit mailing list for scoping notices. Those involved in project development from DNRC include: Garrett Schairer, wildlife biologist; Tony Nelson, soil and hydrology specialist; Jim Bowers, Fisheries Program Specialist; Patrick Rennie, archaeologist; Doug Turman, project leader & forester; and John Shotzberger, Libby Unit Manager. Comments and concerns were addressed and incorporated in the Environmental Assessment.

2. OTHER GOVERNMENTAL AGENCIES WITH JURISDICTION, LIST OF PERMITS NEEDED:

DNRC would need to apply for four 124 permits from MT Dept. Fish, Wildlife and Parks that would allow stream crossings during road construction. Have contacted Department of Environmental Quality (DEQ) and the City of Libby and informed them of the proposed logging activities that will be occurring upslope of a reservoir on Flower Creek that is the municipal water supply intake for the city. At this time there was no major concern of the proposed timber sale activities.

3. ALTERNATIVES CONSIDERED:

No Action: Under the No Action Alternative, no activity would be undertaken. No timber would be harvested and no road construction or improvements would occur. The No Action alternative would result in decreased growth rates, continued decline of stand conditions and increased fuel loading within the project area. This alternative would not produce revenue for the Common Schools Trust grant. Effects of the No Action Alternative are show in the Checklist and Attachments and can be used to compare effects of the proposed action.

Action: The Action Alternative is shown in Section 1, Type and Purpose of Action. No other action alternatives were identified during project scoping or analysis; therefore only forest product removal and sale are being analyzed for in the EA Checklist. Mitigations would be incorporated into the proposed action.

III. IMPACTS ON THE PHYSICAL ENVIRONMENT

- *RESOURCES potentially impacted are listed on the form, followed by common issues that would be considered.*
- *Explain POTENTIAL IMPACTS AND MITIGATIONS following each resource heading.*
- *Enter "NONE" If no impacts are identified or the resource is not present.*

4. GEOLOGY AND SOIL QUALITY, STABILITY AND MOISTURE:

Consider the presence of fragile, compactable or unstable soils. Identify unusual geologic features. Specify any special reclamation considerations. Identify any cumulative impacts to soils.

The Kootenai National Forest land system inventory (LSI) identified no areas of soils at high risk for mass movements in the project area. Ground based yarding can create soil impacts through displacement and compaction. The impacts anticipated with the action alternative are below the range analyzed for in the Expected Future Conditions section of the State Forest Land Management Plan (SFLMP), and well within the 20% impacted area established as a level of concern in the SFLMP. Cumulative effects to soils may occur from repeated entries into a forest stand.

Best Management Practices would be implemented to protect soil resources and limit the magnitude or severity of adverse impacts. These include: allowing ground based equipment operations when soil moisture is dry, or ground is frozen or snow covered; retaining woody debris and green slash on site for maintaining long term site productivity; incorporating slash into skid trails and temporary roads and water-barring them; and reusing existing skid trails from past harvest activities where appropriate.

For detailed analysis, please refer to Attachment B, Soils Analysis. For a complete list of Soil Resource Mitigations, please refer to Attachment G, Summary of Mitigations.

5. WATER QUALITY, QUANTITY AND DISTRIBUTION:

Identify important surface or groundwater resources. Consider the potential for violation of ambient water quality standards, drinking water maximum contaminant levels, or degradation of water quality. Identify cumulative effects to water resources.

A DNRC hydrologist has reviewed the project area, transportation system and harvest plan. The project area is located mostly within the Flower Creek watershed but small portions of the project lie outside of this watershed and have a very low risk of sediment delivery or water yield increases. The project area is drained by an unnamed class 2 tributary to Flower Creek. There are four stream crossings that will be developed and used. Two existing crossings are currently at risk of overtopping during high runoff, these pipes will be upsized and replaced. Another pair of crossings will be developed for logging access and reclaimed after sale activities. These activities in association with road construction, reconstruction and maintenance during the sale activities would generate sediment to the stream for 2-3 years after the completion of the project because of exposure of bare soil. This risk of sediment delivery would decrease to near pre-project levels as the site revegetates.

Ten acres of the proposed project area is located above the Libby water supply reservoir, approximately 9 acres are proposed for harvest in Unit 4. These acres have a very low risk of sediment delivery to the Libby water supply reservoir because no portion of the unit is located closer than 175 feet from the reservoir, and all proposed harvesting is located above a topographic bench above Flower Creek. The presence of flat benches lowers the risk of runoff and sediment delivery, and all applicable BMPs would be used to minimize sediment delivery.

For detailed analysis, please refer to Attachment C, Watershed and Hydrology Analysis. For a complete list of Water Resource Mitigations, please refer to Attachment G, Summary of Mitigations.

6. AIR QUALITY:

What pollutants or particulate would be produced? Identify air quality regulations or zones (e.g. Class I air shed) the project would influence. Identify cumulative effects to air quality.

The project area is located in Montana Airshed 1 and inside the Libby impact zone. Based on located of the timber sale in the Airshed 1, the slash will be abated by other means then burning. Dust may be created from log hauling on portions of native surface roads during summer and fall months. Approximately 1/3 mile of the main haul road that is closest to residences would be graveled, this would reduce the amount of dust created.

7. VEGETATION COVER, QUANTITY AND QUALITY:

What changes would the action cause to vegetative communities? Consider rare plants or cover types that would be affected. Identify cumulative effects to vegetation.

The project area is bordered by USFS, industrial private and small private ownerships. The private ownerships are intensively managing their lands for timber, recreation, grazing, and residential uses. The project area currently is dominated by Mixed Conifer and Western larch/Douglas-fir cover types. Silvicultural prescriptions will promote historic stand conditions favorable for the conversion or maintenance of approximately 90 acres to the western white pine cover type, 325 acres to ponderosa pine cover type and 14 acres of mixed conifer will be maintained. This treatment would assist Libby Unit in meeting its unit wide desired future condition cover types.

Rare plants or cover types listed by the Montana Natural Heritage program have not been found within the project area. There are no old-growth stands located within the project area. An integrated weed management approach would be implemented to limit the potential for the spread and introduction of noxious weeds into the project area.

For detailed analysis, please refer to Attachment D, Vegetative Analysis. For a complete list of Vegetative Resource Mitigations, please refer to Attachment G, Summary of Mitigations.

8. TERRESTRIAL, AVIAN AND AQUATIC LIFE AND HABITATS:

Consider substantial habitat values and use of the area by wildlife, birds or fish. Identify cumulative effects to fish and wildlife.

The project area provides habitat for a variety of wildlife species, including a host of species that require mature forests and/or use snags and coarse woody debris. Deer, elk, and moose use the project area most of the year. Approximately 579 acres of mule deer and elk winter range, and 346 acres of moose winter range exist in the project area. Big game hiding cover exists in the project area. Under the action alternative, approximately 429 acres of western larch/Douglas-fir and mixed conifers would be removed, leading to younger, more open stands. This would alter habitats for wildlife species requiring mature forests, while creating habitats for species needing more open stands of younger forest. Present and future deadwood material would be reduced during the proposed timber harvesting; however several snags and snag recruits would be planned for retention. The action alternative would reduce thermal cover on 429 acres (74%) of the 579 acres of mule deer and elk winter range and 137 acres (40%) of the 346 acres of moose winter range, largely eliminating habitat attributes enabling winter use by these big game species. Roughly 219 acres of the 236 acres in the state parcel that could be suitable elk security habitat would be harvested with this alternative. No changes in legal motorized access to the state parcel would be anticipated under this alternative, however the new roads proposed to be constructed and closed after use could facilitate an increase in foot traffic and illegal motorized vehicular traffic.

Flower Creek flows south to north through the E1/2 of the section and supports native fisheries, including bull trout, westslope cutthroat trout and sculpins, and nonnative fisheries such as eastern brook trout and stock rainbow trout. Since the proposed actions will not occur anywhere within 150' of Flower Creek, no measurable or detectable effects to that stream are expected to occur, and a field review of applicable physical variables was not conducted. An unnamed tributary to Flower Creek flows west to east from the SW1/4 to the NE1/4 of the section between Unit 3 and Unit 4 and through Unit 1. Based on observations this should not be considered a fish-bearing stream.

For detailed analysis, please refer to Attachment E, Wildlife Resources Analysis and Attachment F, Jim Bowers Fisheries Memo. For a complete list of Wildlife Resource Mitigations, please refer to Attachment G, Summary of Mitigations.

9. UNIQUE, ENDANGERED, FRAGILE OR LIMITED ENVIRONMENTAL RESOURCES:

Consider any federally listed threatened or endangered species or habitat identified in the project area. Determine effects to wetlands. Consider Sensitive Species or Species of special concern. Identify cumulative effects to these species and their habitat.

Flower Creek flows south to north through the E1/2 of the section and supports native fisheries, including bull trout, westslope cutthroat trout and sculpins, and nonnative fisheries such as eastern brook trout and stock rainbow trout. Since the proposed actions will not occur anywhere within 150' of Flower Creek, no measurable or detectable effects to that stream are expected to occur.

Potential habitat exists in the project area for fisher, pileated woodpeckers, and flammulated owls. The action alternative would remove roughly 4 acres of riparian fisher habitats included in the regeneration-type treatments and another 25 acres would be harvested with a selection harvest method designed to meet the SMZ law. Most of the 429 harvested acres within the project area would be largely too open to be considered pileated woodpecker habitat after proposed harvesting; however the silvicultural prescriptions would retain healthy western larch, ponderosa pine, Douglas-fir while retaining snags to benefit long-term pileated woodpecker use. Additionally, most of the stands on the 429 acres proposed for harvesting would be more open with an increasing percentage of ponderosa pine, which would result in minor positive benefits to flammulated owls.

For detailed analysis, please refer to Attachment E, Wildlife Resources Analysis and Attachment F, Jim Bowers Fisheries Memo. For a complete list of Wildlife Resource Mitigations, please refer to Attachment G, Summary of Mitigations.

10. HISTORICAL AND ARCHAEOLOGICAL SITES:

Identify and determine effects to historical, archaeological or paleontological resources.

The DNRC staff archaeologist inspected the proposed project area. No heritage properties were identified in the area of potential effect. No additional archaeological investigative work is recommended.

See project file, Resource Analysis, Archeologist findings (e-mail communication).

11. AESTHETICS:

Determine if the project is located on a prominent topographic feature, or may be visible from populated or scenic areas. What level of noise, light or visual change would be produced? Identify cumulative effects to aesthetics.

Upper elevation harvest units would be visible from Montana Highway 37 north of Libby. Active forest management is prevalent in this area on adjacent private ownerships. Within the project area, harvested stands would look more open with fewer trees per acre. The proposed project would be expected to have a low risk of negatively affecting the aesthetic quality of the area. Some noise from harvesting equipment and log hauling may be heard within the area and on haul routes. This is expected to be short in duration.

12. DEMANDS ON ENVIRONMENTAL RESOURCES OF LAND, WATER, AIR OR ENERGY:

Determine the amount of limited resources the project would require. Identify other activities nearby that the project would affect. Identify cumulative effects to environmental resources.

No impacts are likely to occur under either alternative.

13. OTHER ENVIRONMENTAL DOCUMENTS PERTINENT TO THE AREA:

List other studies, plans or projects on this tract. Determine cumulative impacts likely to occur as a result of current private, state or federal actions in the analysis area, and from future proposed state actions in the analysis area that are under MEPA review (scoped) or permitting review by any state agency.

There are no other environmental documents that pertain to the project area.

IV. IMPACTS ON THE HUMAN POPULATION

- *RESOURCES potentially impacted are listed on the form, followed by common issues that would be considered.*
- *Explain POTENTIAL IMPACTS AND MITIGATIONS following each resource heading.*
- *Enter "NONE" If no impacts are identified or the resource is not present.*

14. HUMAN HEALTH AND SAFETY:

Identify any health and safety risks posed by the project.

Harvesting would result in a short term increase of flashy fuels within the project area from the resulting logging slash, thereby increasing the potential fire hazard. Slash treatments prescribed as part of the action plan would meet or exceed the standards for treating logging slash under the Fire Hazard Reduction Law and associated administrative rules.

A short term increase in logging traffic on Libby's city streets would occur during active harvest operations under the action alternative. Signs would be posted on the Upper Flower Creek Road warning oncoming traffic of commercial use.

15. INDUSTRIAL, COMMERCIAL AND AGRICULTURE ACTIVITIES AND PRODUCTION:

Identify how the project would add to or alter these activities.

Commercial logging would occur on 429 acres of state land over a 1-2 year period.

16. QUANTITY AND DISTRIBUTION OF EMPLOYMENT:

Estimate the number of jobs the project would create, move or eliminate. Identify cumulative effects to the employment market.

People are currently employed in the wood products industry in the region. Due to the relatively small size of the timber sale program, there will be no measurable cumulative impact from this proposed action on employment.

17. LOCAL AND STATE TAX BASE AND TAX REVENUES:

Estimate tax revenue the project would create or eliminate. Identify cumulative effects to taxes and revenue.

Due to the relatively small size of the timber sale program, there will be no measurable cumulative impact from this proposed action on tax base or revenues.

18. DEMAND FOR GOVERNMENT SERVICES:

Estimate increases in traffic and changes to traffic patterns. What changes would be needed to fire protection, police, schools, etc.? Identify cumulative effects of this and other projects on government services

There will be no measurable impacts related to demand for government services due to the relatively small size of the timber sale program. There would be short-term increases in traffic, and the small possibility of a few people temporarily relocating to the area.

19. LOCALLY ADOPTED ENVIRONMENTAL PLANS AND GOALS:

List State, County, City, USFS, BLM, Tribal, and other zoning or management plans, and identify how they would affect this project.

The DNRC operates under the State Forest Land Management Plan (SFLMP, DNRC 1996) and Administrative Rules for Forest Management (ARM 36.11.401 through 450, DNRC 2003). The SFLMP established the agency's philosophy for management of forested trust lands. The Administrative Rules provide specific guidance for implementing forest management projects.

20. ACCESS TO AND QUALITY OF RECREATIONAL AND WILDERNESS ACTIVITIES:

Identify any wilderness or recreational areas nearby or access routes through this tract. Determine the effects of the project on recreational potential within the tract. Identify cumulative effects to recreational and wilderness activities.

The area is used frequently for hiking, hunting, cross-country skiing, snowmobiling and general recreating. Currently, roads through the area are closed to motorized use and used only for administrative purposes. There would be no change in road closure status and the selection of either alternative would not affect the ability of people to recreate on this parcel.

21. DENSITY AND DISTRIBUTION OF POPULATION AND HOUSING:

Estimate population changes and additional housing the project would require. Identify cumulative effects to population and housing.

There will be no measurable cumulative impacts related to population and housing due to relatively small size of the timber sale program, and the fact that people are already employed in this occupation in the region.

22. SOCIAL STRUCTURES AND MORES:

Identify potential disruption of native or traditional lifestyles or communities.

The communities and lifestyles of this area have traditionally been and still are dependent on forest management and timber production for employment and other benefits received from this type of land use and management. The action alternative would be consistent with current and traditional lifestyles in this area.

23. CULTURAL UNIQUENESS AND DIVERSITY:

How would the action affect any unique quality of the area?

No impacts related to cultural uniqueness and diversity would be expected under either alternative.

24. OTHER APPROPRIATE SOCIAL AND ECONOMIC CIRCUMSTANCES:

Estimate the return to the trust. Include appropriate economic analysis. Identify potential future uses for the analysis area other than existing management. Identify cumulative economic and social effects likely to occur as a result of the proposed action.

Costs, revenues and estimates of return are estimates intended for relative comparison of alternatives. They are not intended to be used as absolute estimates of return. The estimated stumpage is based on comparable sales analysis. This method compares recent sales to find a market value for stumpage. These sales have similar species, quality, average diameter, product mix, terrain, date of sale, distance from mills, road building and logging systems, terms of sale, or anything that could affect a buyer's willingness to pay for.

No Action: The No Action alternative would not generate any return to the trust at this time.

Action: The timber harvest would generate additional revenue for the Common Schools Trust. The estimated return to the trust for the proposed harvest is $730,000 based on an estimated harvest of 3,500 thousand board feet (17,500 tons) and an overall stumpage value of $41.75 per ton. Costs, revenues, and estimates of return are estimates intended for relative comparison of alternatives, they are not intended to be used as absolute estimates of return.

EA Checklist Prepared By:	**Name:**	Doug Turman	**Date:**	11/01/07
	Title:	Management Forester		

V. FINDING

25. ALTERNATIVE SELECTED:

Upon review of the Checklist EA and appendices I find Action Alternative (alternative 2) as proposed meets the intent of the project objectives as stated on page 1, Type and Purpose of Action. It complies with all pertinent environmental laws, DNRC State Forest Land Management Plan, and a consensus of professional opinion on limits of acceptable environmental impact. The No Action Alternative (alternative 1) does not meet the project objectives. For these reasons I have selected the Action Alternative for implementation on this project.

26. SIGNIFICANCE OF POTENTIAL IMPACTS:

After a thorough review of the scoping documents, Department policies, standards, guidelines, and the State Forest Land Management Plan (SFLMP), I find all the identified resource management concerns have been fully addressed in this Checklist EA and it's appendices. Specific mitigation measures for each resource concern are listed in Appendix F. The action alternative provides for income to the school trust and promotes the development of a healthy, biologically diverse, and productive forest. It also provides the opportunity to improve access and road maintenance within the project area. I find there will be no significant impacts to the human environment as a result of implementing the action alternative. Specific project design features and various resource management specialist recommendations have been implemented to ensure that this project will fall within the limits of acceptable environmental change and result in no significant effects.

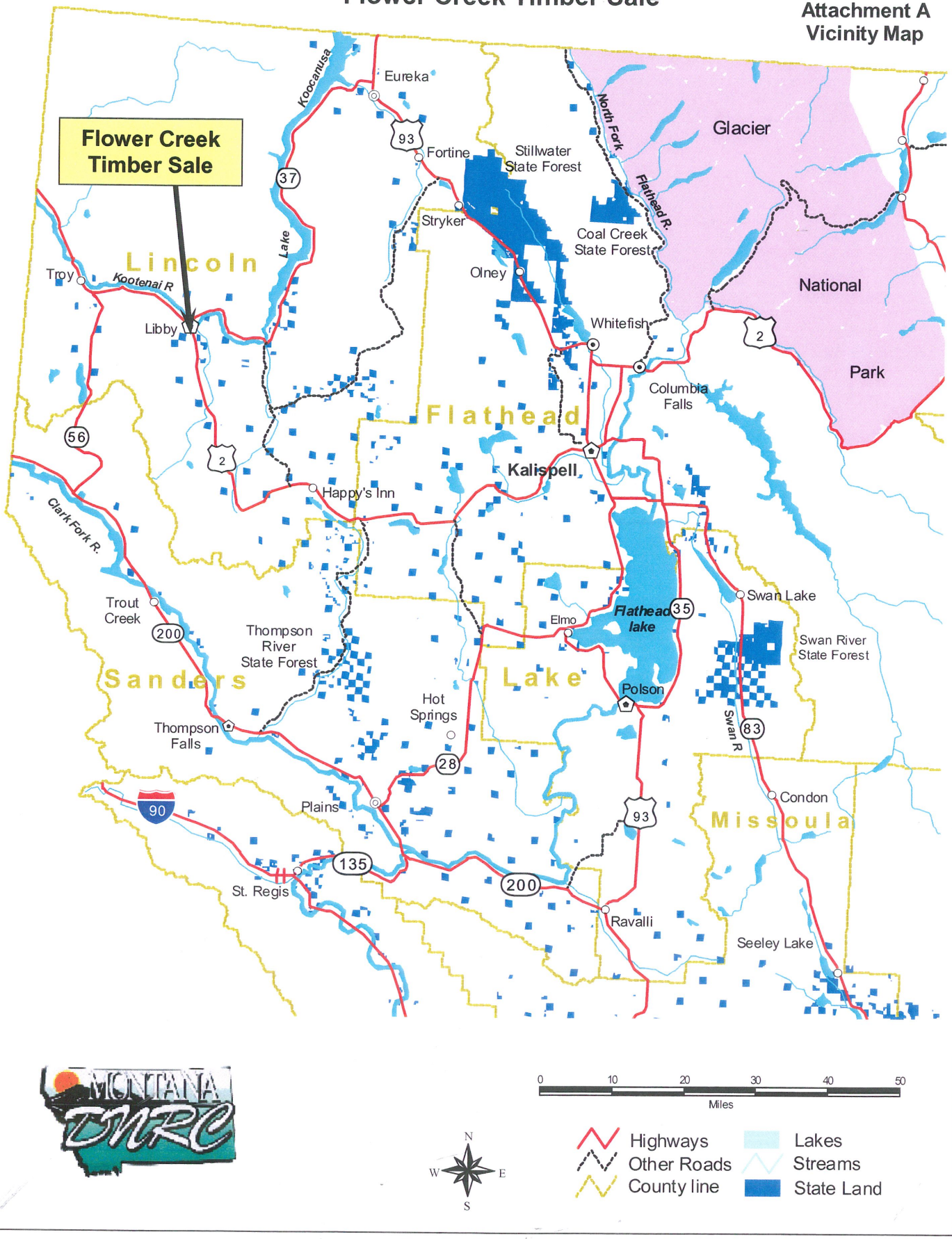
27. NEED FOR FURTHER ENVIRONMENTAL ANALYSIS:

[ ]	EIS	[ ]	More Detailed EA	[X]	No Further Analysis

EA Checklist Approved By:	**Name:**	John Shotzberger
	Title:	Libby Unit Manager
Signature: /s/ John Shotzberger		**Date**: 11/08/2007

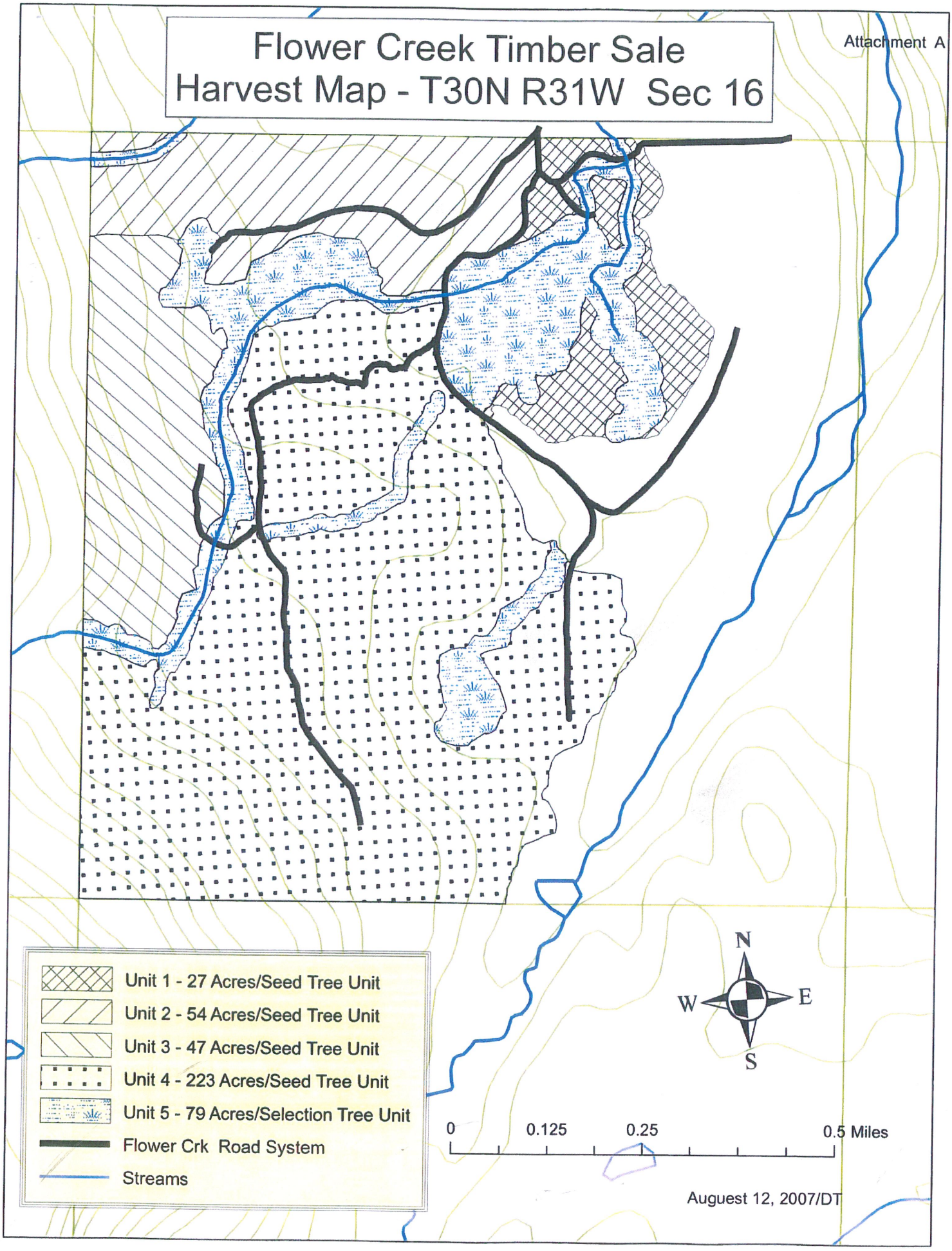
Flower Creek Timber Sale

Attachment A
Vicinity Map



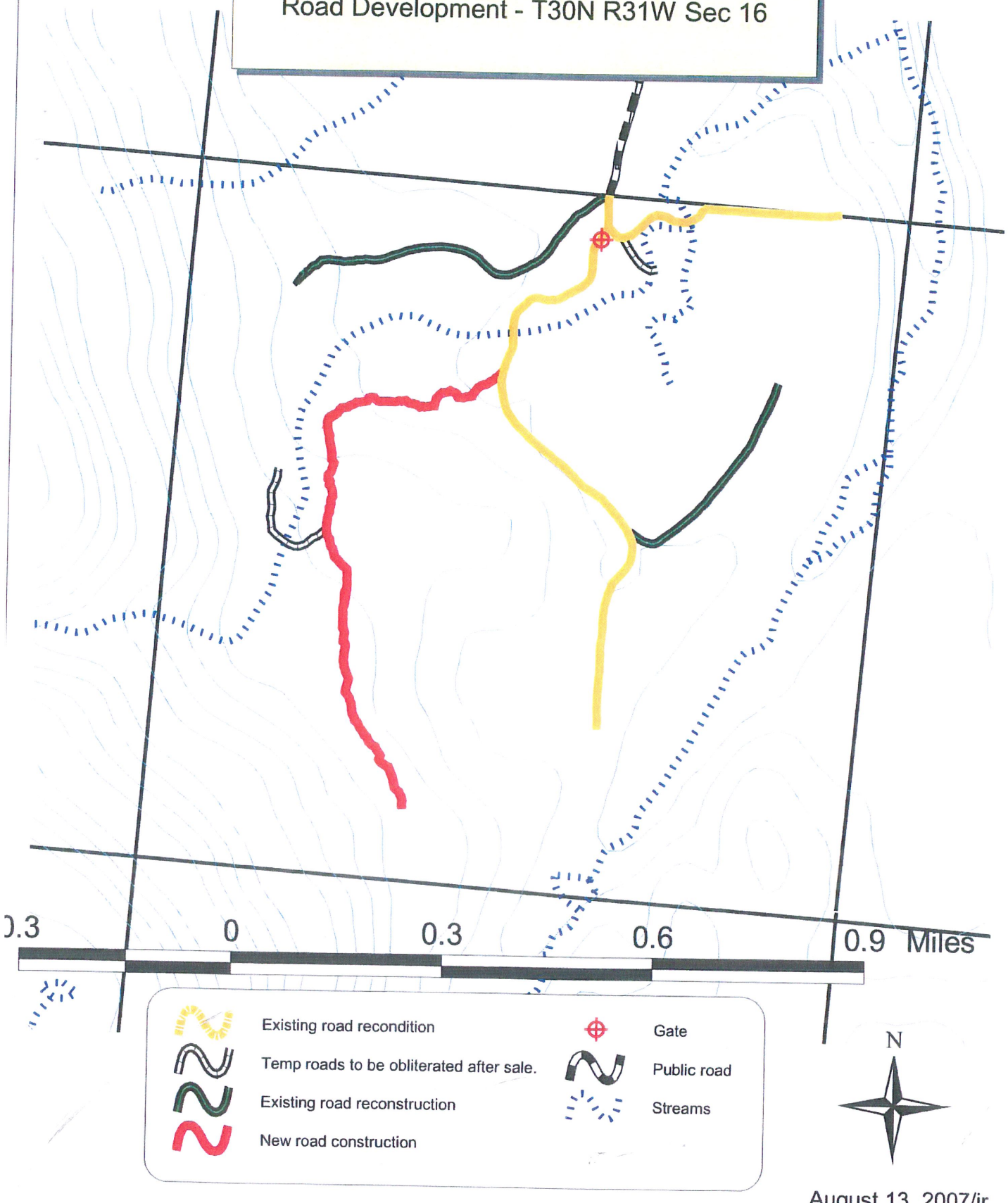
Attachment A

Flower Creek Timber Sale
Harvest Map - T30N R31W Sec 16



Attachment A

Flower Creek Timber Sale
Road Development - T30N R31W Sec 16



August 13, 2007/jr

FLOWER CREEK ENVIRONMENTAL ASSESSMENT
SOILS ANALYSIS

INTRODUCTION

Landform Description

The Flower Creek watershed lies within a valley formed by glaciers and river processes. The dominant landtypes found in the project area include lacustrine terraces, alluvial terraces, kames and kettles, and glaciated mountain slopes. The primary parent material for each of these landtypes is glacial till derived from argillite, siltite and limestone from the Belt Supergroup. Surface soil for each project area landtype is volcanic ash influenced loess.

Soil Physical Properties

This analysis addresses the issue that timber harvesting and associated activities may adversely affect soil conditions in the proposed project area through ground-based harvest operations, and through repeated entries to previously harvested areas. Operation of ground-based machinery can displace fertile layers of topsoil, which can lead to a decrease in vegetation growth. Ground-based machinery can also lead to compaction of the upper layers of soil. Compaction decreases pore space in soil, reduces its water infiltration and retention and can increase surface runoff and overland flow. These conditions can also lead to a decrease in vegetation growth.

Slope Stability

Timber management activities can affect slope stability by removing stabilizing vegetation, concentrating runoff, or by increasing the soil moisture. The primary risk areas for slope stability problems include, but are not limited to, landtypes that are prone to soil mass movement, and soils on steep slopes (generally over 60 percent).

ANALYSIS METHODS

Soil Physical Properties

Impacts to soil physical properties will be analyzed by evaluating the current levels of soil disturbance in the proposed project area based on field review and aerial photo review of existing and proposed harvest units. Percent of area affected is determined through pace transects, measurement, aerial photo interpretation, or GIS to determine skid trail spacing and skid trail width. From this, skid trail density and percent of area impacted are determined. Estimated effects of proposed activities will be assessed based on findings of DNRC soil Monitoring.

Slope Stability

Slope stability risk factors will be assessed by reviewing the Kootenai National Forest Land System Inventory (LSI) to identify landtypes listed as high risk for mass movement. Field reconnaissance will also be used to identify any slopes greater than 60 percent as an elevated risk for mass movement.

ANALYSIS AREA

The analysis area for evaluating soil physical properties and slope stability will include DNRC owned land within the Flower Creek project area. Most of the Flower Creek project is located within portions of the Flower Creek watershed, with a small portion located outside of this watershed with no identifiable surface water features.

EXISTING CONDITIONS

Soil Physical Properties

In the Flower Creek project area, DNRC has conducted timber harvesting since the 1920s. Timber sale records dating back to the 1950s show that approximately 75 acres of timber have been harvested in the proposed project area using ground-based harvest methods. Ground-based yarding can create soil impacts through displacement and compaction of productive surface layers of soil, mainly on heavily used trails. Based on DNRC soil monitoring (DNRC, 2004) completed in the proposed project area on previously harvested stands, existing impacts from historic timber management (1920s) were estimated to be approximately 10% of harvested areas. The monitoring in 1987 also found that displacement was found on 0.5% of the harvested area, and compaction was found on approximately 24.5% of the area. Since both the compaction and displacement were only found on skid trails, the total impacted soils were estimated at 24.5% of the area. This rate is attributed to a combination of dispersed skidding pattern due to nearly level terrain and because of the drag chain method of scarification done for site preparation. It was also noted that this level of impacts did not meet the analysis criteria. Trails are still apparent, but most are well vegetated and past impacts are beginning to ameliorate from freeze-thaw cycles and root penetration.

Slope Stability

Landtypes in the project area vary from nearly level wetlands and stream bottoms to glaciated mountain slopes in the southwest corner of the project area. The Kootenai National Forest LSI identified no areas of soils at high risk for mass movements in the project area. No slope failures were identified during reconnaissance in the proposed project area, and slopes are less than 60 percent. Because none of the slope stability risk factors are present in the proposed project area, slope stability will not be evaluated in the remainder of this analysis. A list of landtypes found in the proposed project area and the associated management implications are found in table III-12 – Soil Map Unit Descriptions for the Flower Creek Project Area.

DIRECT AND INDIRECT EFFECTS

Direct and Indirect effects of No Action Alternative

The No Action Alternative would have no direct or indirect effects on soil productivity. No ground-based activity would take place under this alternative, which would leave the soil in the project area unchanged from the description in the Existing Conditions portion of this analysis.

Direct and Indirect effects of Action Alternative

Soil Physical Properties

Based on DNRC soil monitoring, direct impacts would be expected on up to 69 of the total 429 acres proposed for harvesting. Soil monitoring conducted on DNRC lands shows that sites harvested on DNRC lands statewide on similar soils with ground-based machinery had a range of impacts from 4.4 to 37.8 percent of the acres treated, with an average disturbance rate of 16.2% (DNRC, 2004). The low range of impacts includes operations on frozen or snow-covered soils, and the high range includes operations on wet soils. As a result, the extent of impacts expected would likely be similar to those reported by Collins (DNRC, 2004), or approximately 4.6 to 9.0 percent of ground-based harvested acres.

Ground-based site preparation would also generate direct impacts to the soil resource. Site-preparation disturbance would be intentionally done, and these impacts are considered light and promote reforestation of the site. Approximately 1 mile of new road and approximately 0.2 miles of temporary road would be constructed with the Action Alternative. *Table III-10 – Summary of Direct Effects of Alternatives on Soils* summarize the expected impacts to the soil resource as a result of the Action Alternative. These activities would leave up to 17 percent of the proposed harvest units in an impacted condition. This level is below the range analyzed for in the *EXPECTED FUTURE CONDITIONS* section of the *SFLMP*, and well within the 20-percent impacted area established as a level of concern in the *SFLMP (DNRC 1996)*. In addition, BMPs and a combination of mitigation measures would be implemented to limit the area and degree of soil impacts as noted in ARM 36.11.422 and the SFLMP (DNRC, 1996).

TABLE III-10 – SUMMARY OF DIRECT EFFECTS OF ALTERNATIVES ON SOILS

Description of Parameter	Alternative	
	No Action	*Action*
Acres of Harvest	0	429
Acres of tractor yarding	0	429
Avg. acres of ground-based impacts (16.2% harvest)	0	69
Acres of new and temp road construction (1.2 miles)	0	4
Total acres of moderate impacts	0	73
Percent of harvest area with impacts	0%	17.0%

CUMULATIVE EFFECTS

Cumulative Effects of No Action Alternative

Soil Physical Properties

This alternative would have no cumulative impacts to physical properties of soils in the project area. The impacts of this alternative would be similar to those described in the Existing Conditions portion of this analysis. No soil would be disturbed and no re-entry of past harvest units would occur. All impacts from past management activities would continue to improve or degrade as dictated by natural and pre-existing conditions.

Cumulative Effects of Action Alternative

Soil Physical Properties

Approximately 100 acres with previous timber sale operations would be entered. These acres would include only 1920s-era management, none of the areas managed from the 1990 Flower Creek sale would be re-entered. Cumulative effects to soils may occur from repeated entries into a forest stand where additional ground is impacted by equipment operations. Existing skid trails where compaction has begun to ameliorate through freeze-thaw cycles and revegetation would return to a higher level of impact due to the Action Alternative. Additional trails may also be required if existing trails are in undesirable locations. Cumulative impacts to soil physical properties under the Action Alternative would still fall below the range analyzed for in the EXPECTED FUTURE CONDITIONS section of the SFLMP and are well within the 20-percent impacted area established as a level of concern in the SFLMP (DNRC, 1996).

DNRC would minimize long-term soil impacts and adverse cumulative effects by implementing any or all of the following: 1) existing skid trails from past harvest activities would be used if they are properly located and spaced 2) additional skid trails would be used only where existing trails are unacceptable 3) mitigating the potential direct and indirect effects with soil moisture restrictions, season of operation, and method of harvest 4) retention of a portion of coarse woody debris and fine litter for nutrient cycling. In previously unharvested stands, cumulative effects to soil productivity from multiple entries would be the same as those listed in the direct and indirect effects sections.

TABLE III-12 – SOIL MAP UNIT DESCRIPTIONS FOR THE FLOWER CREEK PROJECT AREA

Map Unit[1]	Description	Soil Drainage	Road Limitations	Topsoil Displacement & Compaction	Seedling Establishment	Erosion (Bare Surface)	Notes
102	Lacustrine Terraces	Poor to Well Drained	Soil Crusting	Severe	Good	Moderate	Streamside management guides will be applied.
103	Alluvial Terraces	Poor	Low	Severe	Good	Moderate	Wetland soil types, avoid operation
104	Kames and Kettles	Well Drained	Soil Crusting	Mod/High	Mod – Frost Pockets	Severe	Mod. deep coarse soils reduce water and nutrients. South slopes droughty. On slopes over 35% lop and scatter slash, excavator pile or broadcast burn.
352	Glaciated Mountain Slopes, 20-60%	Well Drained	Soil Crusting	Mod/High	Good	Moderate	Season of use important. Trees susceptible to wind throw. Cable logging recommended for slopes over 45%.

[1]Kootenai National Forest Land Types. Interpretations taken from: Kuennen, Louis J. and Marci L. Nielsen-Gerhardt. 1995. *Soil Survey of Kootenai National Forest Area, Montana and Idaho*. USDA Forest Service.

FLOWER CREEK ENVIRONMENTAL ASSESSMENT
WATERSHED AND HYDROLOGY ANALYSIS

INTRODUCTION

Sediment Delivery

Timber harvesting and related activities, such as road construction, can lead to water quality impacts by increasing the production and delivery of fine sediment to streams. Construction of roads, skid trails, and landings can generate and transfer substantial amounts of sediment through the removal of vegetation and exposure of bare soil. In addition, removal of vegetation near stream channels reduces the sediment filtering capacity and may reduce channel stability and the amounts of large woody material. Large woody debris is a very important component of stream dynamics, creating natural sediment traps and energy dissipaters to reduce the velocity and erosiveness of stream flows. In portions of the project area located within a municipal watershed, added constraints and protection measures may be necessary to protect the integrity of the municipal water intake

Water Yield

Timber harvesting and associated activities can affect the timing, distribution, and amount of water yield in a harvested watershed. Water yields increase proportionately to the percentage of canopy removal, because removal of live trees reduces the amount of water transpired, leaving more water available for soil saturation and runoff. Canopy removal also decreases interception of rain and snow and alters snowpack distribution and snowmelt, which lead to further water yield increases. Higher water yields may lead to increases in peak flows and peak-flow duration, which can result in accelerated streambank erosion and sediment deposition.

ANALYSIS METHODS

Sediment Delivery

Methodology for analyzing sediment delivery was completed using a sediment source inventory. All roads and stream crossings were evaluated to determine existing and potential sources of introduced sediment. In addition, in-channel sources of sediment were identified using channel stability rating methods developed by Pfankuch, and through the conversion of stability rating to reach condition by stream type developed by Rosgen (1990). These analyses were conducted in 2006 by a DNRC hydrologist.

Water Yield

The water yield increase for the watershed in the project area was determined using the equivalent clearcut area (ECA) method as outlined in Forest Hydrology Part II (1976). ECA is a function of total area roaded and harvested, percent crown removal in harvest, and amount of vegetative recovery that has occurred in harvest areas. This method equates area harvested and percent crown removed with an equivalent amount of clearcut area. For example, if 100 acres had 60 percent crown removed, ECA would be

approximately 60, or equivalent to a 60 acre clearcut. The relationship between crown removal and ECA is not a 1 to 1 ratio, so the percent ECA is not always the same as the percent canopy removal. As live trees are removed, the water they would have evaporated and transpired either saturates the soil, or is translated to runoff. This method also calculates the recovery of these increases as new trees vegetate the site and move toward pre-harvest water use.

In order to evaluate the watershed risk of potential water yield increase effectively, a threshold of concern must be established. The stability of a stream channel is an important indicator of where a threshold of concern should be set. As water yields increase as a result of canopy removal, the amount of water flowing in a creek gradually increases. When these increases reach a certain level, the bed and banks may begin to erode. More stable streams will be able to handle larger increases in water yield before they begin to erode, while less stable streams will experience erosion at more moderate water yield increases.

ANALYSIS AREA

Sediment Delivery

The analysis area for sediment delivery is the Flower Creek project area, and the proposed haul routes. The proposed project area is located mostly within the Flower Creek watershed, which is a perennial tributary to the Kootenai River. Analysis will cover stream segments within these watersheds that may be affected by the proposed project and all roads and upland sites that may contribute sediment to Flower Creek.

Water Yield

The analysis area for water yield is the Flower Creek watershed. The Flower Creek watershed covers 11,918 acres. Portions of the proposed project area lie outside of these watersheds, but these areas have no defined stream channels, and are very low risk of showing measurable or predictable changes in water yield. Precipitation in the project area watersheds ranges from 18 inches in the lower elevations to 70 inches at the ridge tops.

EXISTING CONDITIONS

Regulatory Framework

Montana Surface Water Quality Standards: According to ARM 17.30.609 (1), Approximately 10 acres of the proposed project area is located above the Libby water supply intake, and is classified as A-1. Among other criteria for A-1 waters, no increases are allowed above naturally occurring levels of sediment or turbidity. "Naturally occurring," as defined by ARM 17.30.602(17), includes conditions, or materials present during runoff from developed land where all reasonable land, soil and water conservation practices (commonly called BMPs) have been applied. Reasonable practices include methods, measures or practices that protect present and reasonably anticipated beneficial

uses. These practices include but are not limited to structural and non-structural controls and operations, or after completion of potentially impactive activities

The remainder of the Flower Creek drainage is classified as B-1. Among other criteria for B-1 waters, no increases are allowed above naturally occurring levels of sediment, and minimal increases over natural turbidity. "Naturally occurring," as defined by ARM 17.30.602 (17), includes conditions or materials present during runoff from developed land where all reasonable land, soil and water conservation practices (commonly called BMPs) have been applied. Reasonable practices include methods, measures or practices that protect present and reasonably anticipated beneficial uses. These practices include but are not limited to structural and non-structural controls and operation and maintenance procedures. Appropriate practices may be applied before, during, or after completion of potentially impactive activities.

Designated beneficial water uses within the project area include cold water fisheries and recreational use in the streams, wetlands and lakes. Existing surface water rights in the project area include domestic use, irrigation, stock watering and municipal. Domestic use refers to wells and water rights assigned to individual property owners, and the municipal designation refers to the Libby municipal water supply.

Water Quality Limited Waterbodies: None of the streams in the proposed project area is listed in the 2006 List of Waterbodies in Need of Total Maximum Daily Load (TMDL) Development publication produced by the Montana Department of Environmental Quality (DEQ 2006).

Montana Streamside Management Zone (SMZ) Law: By the definition in ARM 36.11.312 (3), Flower Creek is a class 1 stream. Flower Creek has flow for more than 6 months each year, contributes surface water to another body of water and support fish populations. By the Definition in ARM 36.11.312(3) through (5), the tributaries to Flower Creek located in the north and western portions of the project area are class 2 streams. They have a defined channel, generally flow less than six months of the year, do not support fish, and contribute surface flow to another body of water. A class 2 stream is defined as a stream that does not meet the criteria for class 1 or class 3 streams.

Sediment Delivery

According to field reconnaissance in 2006, stream channels in the project area were rated in good condition. Project area streams were rated as B3 and B4 channels by a classification system developed by Rosgen (1990). Channel types rated as “B” are typically in the 2-4% gradient range, and have a moderate degree of meander (sinuosity). Channel bed materials in B3 and B4 types are mainly cobble and gravel. Stream channels in the project area were found to be very stable with very little movement of bed materials. Channel bottom materials are covered with moss, and no areas of down-cut channels were identified during field reconnaissance. Large woody debris was found in adequate supply to maintain channel function and stability. Little evidence of past streamside harvest was found in the Flower Creek drainage. Where there had been past logging in the riparian area, mainly in an unnamed tributary to Flower Creek, there

appeared to be adequate downed woody material to provide grade control and channel stability.

The existing road system in and leading to the proposed project area was reviewed for potential sources of sediment. The road system in the project area is mainly low to moderate standard. Evidence of sediment delivery to a wetland was identified during field reconnaissance. This delivery only occurs during spring snowmelt when an abundance of water is available on the road system. The delivery is occurring through a ditch relief culvert, and the length of delivery from the road is approximately 200 feet. Road surfaces are partially vegetated and not delivering sediment to crossings. One existing stream crossing was identified during field reconnaissance on the main road accessing the project area. This crossing is undersized, and poses a risk of overtopping with high runoff events. Sediment delivery was not observed at this site. Much of the existing road system in the proposed project area does not meet applicable BMPs.

An existing crossing is found on the north boundary of the project area. The road has an easement to access private property. The existing structure is a collapsing native material crossing constructed of wood and earth fill. The structure is failing, and the risk of the road overtopping is high. This is an open road with private access to adjacent landowners that does not meet applicable BMPs.

Water Yield

According to *ARM 36.11.423*, allowable water-yield increase values were set at levels to ensure compliance with all water-quality standards, protect beneficial uses, and exhibit a low to moderate degree of risk. All allowable water-yield increases in project-area watersheds were set using a low level of risk. This means that the allowable level is a point below which water yields are unlikely to cause any measurable or detectable changes in channel stability. The allowable water yield increase for the Flower Creek watershed has been set at 11% based on channel stability evaluations, watershed sensitivity, and acceptable risk. This water yield increase would be reached when the ECA level in the Flower Creek watershed reaches the allowable level of 3,277 acres. Timber harvesting and associated road construction activities have taken place in and around the project area since the 1920s. These activities combined with the vegetative recovery that has occurred have led to an estimated 1.2% water yield increase over an unharvested condition in the Flower Creek watershed. Table 1 summarizes the existing conditions for water yield in the project area watersheds.

TABLE 1 – CURRENT WATER YIELD AND ECA INCREASES IN FLOWER CREEK

	Flower Creek
% WYI[1]	1.2%
Allowable % WYI	11%
Existing ECA[2]	849
Allowable ECA[2]	3,277
Remaining ECA[2]	2,429

[1]Water Yield Increase

[2]Equivalent Clearcut Area (expressed in acres)

Streams within the proposed project area were reviewed in 2007 by a DNRC fish biologist. No fish were present in any tributaries to Flower Creek within proposed harvest units. The main stem of Flower Creek supports populations of bull trout and westslope cutthroat trout, but is located well outside of proposed harvest units. A fisheries analysis can be found in the attachments to the Environmental Assessment.

DIRECT AND INDIRECT EFFECTS

Direct and Indirect Effects of No Action Alternative

Sediment Delivery

The No Action Alternative would have no direct effects to sediment delivery beyond those currently occurring. Existing and potential sources of sediment, both in-channel and out of channel would continue to recover or degrade based on natural or pre-existing conditions.

Indirect effects of No Action Alternative would be an increased risk of erosion and sediment transport from upland road segments that do not meet applicable BMPs. These sites would continue to pose a risk of sediment delivery to streams until other funding became available to repair them.

Water Yield

The No Action Alternative would have no direct or indirect effects on water yield. Water quantity would not be changed from present levels.

Direct and Indirect Effects of Action Alternative

Sediment Delivery

The Action Alternative would improve erosion control and BMPs on approximately 1.7 miles of existing road. In some cases, the addition of erosion control measures may increase the risk of sediment routing from upland sites in the short term by creating bare soil. However, as these sites re-vegetate, the long-term risk of sediment routing to a stream would be reduced to levels lower than the existing condition.

Approximately 1 mile of new road and approximately 0.2 miles of temporary road would be constructed with the Action Alternative. These roads would be constructed using all applicable BMPs.

An existing crossing on the main road in the project area would be replaced with this alternative. The existing culvert is undersized and would be replaced with a larger pipe. This crossing would be designed to carry a minimum 25-year runoff event, and would be a lower risk of overtopping than the current structure. This project would generate sediment to the stream during activity. This sediment would be minimized by application of all applicable BMPs. Risk of sediment delivery would be increased at the site for 2 to

3 years after project completion because of exposure of bare soil. This risk would decrease to near pre-project levels as the site revegetates.

An existing stream crossing on the northern boundary of the proposed project area would be replaced with the action alternative. The road has an easement to access private property. The new crossing would install a culvert sized to carry at least a 25-year magnitude storm, and would meet all applicable BMPs. This project would generate sediment to the stream during activity. This sediment would be minimized by application of all applicable BMPs. Risk of sediment delivery would be increased at the site for 2 to 3 years after project completion because of exposure of bare soil. This risk would decrease to near pre-project levels as the site revegetates.

Two temporary stream crossings would be used and removed with the Action Alternative. One of the crossings would be an improved drive-through on the temporary spur in the western portion of the proposed project area. This improved drive-through crossing would be installed in the lower reaches of proposed unit 3. The other temporary crossing would be a temporary culvert installation on the short spur in the northern portion of Unit 1 near the large wetland. The channel where the crossing would be installed drains a portion of the large wetland found in Unit 1. The pipe would be installed and fill placed to provide access on the short spur. Sediment fence and all applicable BMPs would be installed for the duration of use. Upon project completion, all crossing material at each site would be removed from the channel and the crossing approaches would be reshaped to natural contour and have erosion control structures installed to prevent sediment delivery. These projects would generate sediment to the stream during activity. This sediment would be minimized by application of all applicable BMPs. Risk of sediment delivery would be increased at the site for 2 to 3 years after project completion because of exposure of bare soil. This risk would decrease to near pre-project levels as the site revegetates.

The proposed Action Alternative would have a very low risk of sediment delivery to streams as a result of proposed timber harvest activities. Harvesting activities are proposed on approximately 77 acres within designated SMZs. These harvesting activities would retain at least 50 percent of the trees within the SMZ, would follow all requirements of the SMZ Law and ARM 36.11.425 through 36.11.427, and would have a low risk of affecting recruitment of large woody material to project area streams. The SMZ law, ARM 36.11.425 through 36.11.427, and all applicable BMPs would be applied to all harvesting activities, which would minimize the risk of sediment delivery to draws and streams.

Of the 10 acres of the proposed project area located above the Libby water supply reservoir, approximately 9 acres are proposed for harvest in Unit 4. These acres have a very low risk of sediment delivery to t he Libby water supply reservoir because no portion of the unit is located closer than 175 feet from the reservoir, and all proposed harvesting is located above a topographic bench above Flower Creek. The presence of flat benches lowers the risk of runoff and sediment delivery, and all measures listed above would apply to these acres as well.

Water Yield
The Action Alternative would increase the annual water yield in the Flower Creek watershed by an estimated 0.4% over the current level. This level of water yield increase would not be sufficient to create unstable channels.

CUMULATIVE EFFECTS

Cumulative Effects of No Action Alternative

Sediment Delivery
The cumulative effects of the No Action Alternative on sediment delivery would be very similar to those described in the existing conditions portion of this analysis. All existing sources of erosion and sediment transport from upland road segments would continue to recover or degrade as dictated by natural and pre-existing conditions until a source of funding became available to repair them. Sediment loads would remain at or near present levels.

Water Yield
The No Action Alternative would have no cumulative effects on water yield. Existing timber harvest units would continue to re-vegetate and move closer to pre-management levels of water use and snowpack distribution.

Cumulative Effects of Action Alternative

Sediment Delivery
Cumulative effects to sediment delivery under the Action Alternative would be primarily related to roadwork. The installation and improvement of erosion control and surface drainage features on existing roads would also affect the cumulative sediment delivery to project area streams. In the short term, the installation and improvement of surface drainage features would expose bare soil. This would increase the risk of sediment routing to streams in and around the proposed project area. The application of all applicable BMPs during this work would make increased sediment loads unlikely. Over the long term, cumulative risk of sediment delivery to project area streams is projected to be lower than existing conditions with the installation of more effective surface drainage and erosion control features on the existing road system.

The proposed stream crossing on the main road in the project area would be replaced with the action alternative. This activity would increase total sediment loads in the stream in the short term. This sediment load increase would not be delivered to downstream waters due to the presence of a wetland complex that would settle out the material before delivering to Flower Creek. Over the long term, risk of increased sediment loading to the downstream waters would be lower than the existing conditions due to the lowered risk of the existing crossing becoming overtopped and the fill washed out. Sediment delivery would be minimized through application of BMPs, mitigation

measures, and any stipulations or specifications required through the Stream Protection Act permitting process with the Montana Department of Fish, Wildlife and Parks.

The proposed stream crossing on the northern boundary of the proposed project area would be replaced with the action alternative. The road has an easement to access private property. This activity would increase total sediment loads in the stream in the short term. This sediment load increase may be delivered to downstream waters. Over the long term, risk of increased sediment loading to the downstream waters would be lower than the existing conditions due to the lowered risk of the existing crossing becoming overtopped and the fill washed out. Sediment delivery would be minimized through application of BMPs, mitigation measures, and any stipulations or specifications required through the Stream Protection Act permitting process with the Montana Department of Fish, Wildlife and Parks.

Two temporary stream crossings would be used and removed with the Action Alternative. One of the crossings would be an improved drive-through on the temporary spur in Unit 3 of the proposed project area. The other temporary crossing would be a temporary culvert installation on the short spur in the northern portion of Unit 1 near the large wetland. These activities would increase total sediment loads in the stream in the short term. This sediment load increase would not be delivered to downstream waters due to the presence of a wetland complex that would settle out the material before delivering to Flower Creek. Over the long term, risk of increased sediment loading to the downstream wetland would be similar to the existing conditions once the site becomes revegetated.

Harvesting of trees within a SMZ would have a low risk of adverse cumulative effects to downed woody material or sediment delivery in project area streams. Tree retention requirements of the SMZ Law and Forest Management Rules would ensure a future supply of woody material to the creeks. Equipment restrictions in the SMZ Law and Forest Management Rules would prohibit the use of ground based equipment within 50 feet of any stream, which would minimize the risk of bare soil erosion or transport reaching a stream channel.

Of the 10 acres of the proposed project area located above the Libby water supply reservoir, approximately 9 acres are proposed for harvest in Unit 4. These acres have a very low risk of sediment delivery to t he Libby water supply reservoir because no portion of the unit is located closer than 175 feet from the reservoir, and all proposed harvesting is located above a topographic bench above Flower Creek. The presence of flat benches lowers the risk of runoff and sediment delivery, and all measures listed above would apply to these acres as well.

None of the cumulative impacts described above are expected to adversely affect downstream beneficial uses. All activities would comply with applicable laws, ARM 36.11.423, and 36.11.425 through 36.11.427.

Water Yield

The removal of trees proposed in the Action Alternative would increase the water yield in the Flower Creek watershed from its current level of approximately 1.2% over unharvested to an estimated 1.6%. These water yield increases, and the associated ECA levels, include the impacts of all past management activity, existing and proposed roads, proposed timber harvesting and vegetative hydrologic recovery in the watershed. The water yield increases expected from the Action Alternative leave the watershed well below its established threshold of concern. There is a low risk of adverse cumulative impacts to water quality as a result of the Action Alternative. Estimated water yield increases would not be sufficient to create unstable stream channels or increased in-channel erosion. A summary of the anticipated water yield impacts of the Action Alternative to the Flower Creek watershed is found in table 2.

TABLE 2 – WATER YIELD AND ECA INCREASES IN THE FLOWER CREEK WATERSHED

	Alternative	
	No Action	**Action**
Allowable WYI	11%	11%
% WYI	1.2%	1.6%
Acres Harvested[1]	0	429
ECA Generated[2]	0	361
Total ECA[2]	849	1,210
Remaining ECA[2]	2,428	2,067
Allowable ECA[2]	3,277	3,277

[1] Refers only to acres harvested within the Flower Creek watershed
[2]Equivalent Clearcut Area, including roads (expressed in acres)

References:

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Flower Creek Environmental Assessment
VEGETATIVE ANALYSIS

INTRODUCTION

This analysis is designed to disclose the existing condition of the vegetative resources and display the anticipated effects that may result from each alternative of this proposal. During the initial scoping, the following vegetative issues were identified from internal and external comments regarding the effects of proposed timber harvesting:

- Timber harvesting could rectify the imbalance of species composition, age distribution and stand health.
- Timber harvesting could affect any identified sensitive, threatened, or endangered species.
- Timber harvesting and associated activities could cause the spread of noxious weeds.

The following sections disclose the anticipated indirect, direct and cumulative effects to these vegetative resources in the analysis area from the proposed actions. Past, current, and future planned activities on all ownerships within each analysis area have been taken into account for the cumulative effects analysis.

ANALYSIS AREA

In this section the discussions will focus on 2 areas of different scale. The first will be the "project area", which consists of the state managed portion of section 16 in T30N R31W. The parcel ranges from 2,320 to 3,040 feet elevation and is largely on a northeastern aspect with slopes of varying steepness. The parcel is dominated by Douglas-fir/western larch and mixed conifer habitats with lesser amounts of ponderosa pine, lodgepole pine, and cottonwood. The second scale or the "analysis area" relates to the surrounding landscape for assessing cumulative effects.

ANALYSIS METHODS

DNRC attempts to promote biodiversity by taking a 'coarse-filter approach', which favors an appropriate mix of stand structures and compositions on State lands (ARM 36.11.404). Appropriate stand structures are based on ecological characteristics (e.g., land type, habitat type, disturbance regime, unique characteristics). A coarse-filter approach assumes that if landscape patterns and processes are maintained similar to those with which the species evolved, the full complement of species would persist and biodiversity would be maintained. This coarse-filter approach supports diverse vegetation populations by managing for a variety of forest structures and compositions that approximate historic conditions across the landscape. DNRC cannot assure that the coarse-filter approach will adequately address the full range of biodiversity; therefore, DNRC also employs a "fine-filter" approach for threatened, endangered, and sensitive species (ARM 36.11.406). The fine-filter approach focuses on a single species' habitat requirements.

To assess the existing condition of the proposed project area and surrounding landscape, a variety of techniques were used. Field visits, scientific literature, SLI data, aerial photographs, Montana Natural Heritage Program data, and consultations with other professionals provided information for the following discussion and effects analysis.

A. Existing Forest Conditions

The State Forest Land Management Plan (SFLMP) directs DNRC to promote biodiversity by taking a coarse filter approach thereby favoring an appropriate mix of stand structures and compositions on State land. Components used to determine an appropriate mix of stand conditions at the landscape level include cover type proportions, age class distributions, stand structural characteristics, and the spatial relationships of stands- i.e. size and location on the landscape.

1. Libby Unit (landscape level) Cover Types

Estimate of current and desired future conditions were determined at the Landscape level for the entire Libby Unit in 2006. The Libby Unit's Inventory (SLI) was used in conjunction with John Losenky's 1997 report *Historical Vegetation of Montana* to compare present (current) conditions with historical (desired) conditions for this landscape in regards to amount and distribution of cover types. Table 1 displays this information:

Table 1: Current and Desired Future Conditions for the Libby Unit

Cover Type	Current Cover Type (Acres)	Desired Future Conditions (Acres)	Current Type Minus (–) Desired Future Cond.
DF	1,817	258	1,559 acre surplus
HW	219	219	0
LP	1,244	185	1,059 acre surplus
MC	4,732	341	4,391 acre surplus
PP	12,332	18,717	6,385 acre deficit
SUBALP	277	45	232 acre surplus
WL/DF	8,703	8,589	114 acre surplus
WWP	494	1,698	1,204 acre deficit
OTHER	250	16	234 acre surplus
TOTAL	30,068	30,068	

DF=Douglas-fir, HW=hardwood, LP=Lodgepole, MC=Mixed conifer, PP=Ponderosa pine, WL/DF=Western larch/Douglas-fir, WWP=Western white pine, SUB/ALP=subalpine fir, Other=nonstocked. The Current Type minus Desired Future Conditions above lists the excess and deficit (-) acres for each cover type.

The PP and WWP cover types are not as well represented within the Libby Landscape as estimated for the early 1900's. Most notable, is the conversion of over 6,300 acres from the PP cover type, over the last 100 years, to the present over abundance of the MC, LP, WL/DF and DF cover types.

This cover type shift is typical for Northwest Montana and it does represent a change in stand conditions. Active fire suppression initiated in the early 1900's has interrupted wildfire frequencies and intensities in conjunction with 50 years or more

of logging practices that favored the removal of commercially valuable western larch (*Larix occidentalis*), ponderosa pine (*Pinus ponderosa*), western white pine (*Pinus monticola*) and Douglas-fir (*Pseudotsuga menziesii*) for railroad ties, mining timbers, and construction lumber. Many open, mature stands dominated by western larch and other seral species with even-aged patches of immature seral trees in the understory have been replaced with more densely stocked stands in both the overstory and understory that includes a higher percentage of more shade tolerant trees such as, grand fir (*Abies grandis*), Engelmann spruce (*Picea engelmannii*) and western hemlock (*Tsuga heterophylla*).

2. Flower Creek (project area) Cover Types

The Flower Creek project area comprises 640 acres (~2%) of the Libby Unit landscape. Stand level inventory (SLI) data specific to project area in Section 16 T30N R31W is summarized below for cover types and age class distribution. Site review observations and stand measurements were used to update, confirm or refine the SLI data for this section.

Table 2 displays current and appropriate cover types for the Flower Creek project area. The project area reflects the forest cover type shift similar to the landscape level, as species compositions are trending towards shade tolerant species dominating the composition of theses timber stands.

Table 2: Current and Desired Future Conditions for the Flower Creek (Section 16, T30N, R31W)

Cover Type	Current Cover Type (Acres)	Desired Future Conditions (Acres)	Current – DFC (Acres)
DF			
HW	22	22	0
LP	8	0	8 acre surplus
MC	219	66	153 acre surplus
PP	57	82	25 acre deficit
SUB/ALP			
WL/DF	268	368	100 acre deficit
WWP	67	103	36 acre deficit
OTHER			
TOTAL	641	641	

DF=Douglas-fir, HW=hardwood, LP=Lodgepole, MC=Mixed conifer, PP=Ponderosa pine, WL/DF=Western larch/Douglas-fir, WWP=Western white pine, SUB/ALP=subalpine fir, Other=nonstocked. The Current Type minus Desired Future Conditions above lists the excess and deficit (-) acres for each cover type.

3. Flower Creek Stand History

Records show that a large timber sale occurred during the period of 1923 to 1926 where ~8.5 million board feet was removed. Over 75% of the section was logged. The stand cover in the early 1900's was WL/DF and PP, after the sale it has gradually converted to a MC type. With this gradual conversion to MC the stand health has deteriorated significantly over the last 30 years due to insects and disease causing a high rate of mortality in the grand fir and Douglas-fir.

4. Libby Unit (landscape level) Age Class Distribution

The Libby Unit's Stand Level Inventory (SLI) 2005 version was used to summarize the estimated age class distribution for current cover types. Table 3 displays this information.

Table 3: Libby Unit Age Class Distribution by Current Cover Type

Sum of Acres in Age Class Groups (years):								
	No Age Data	Non Forested	00 - 39	40 - 99	100 – 149	150 +	Old Growth	**Total**
DF	306			813	436	262		**1,817**
HW				102	117			**219**
LP			891	294	58			**1,243**
MC			339	929	1,961	724	780	**4,733**
NonFor		483						**483**
NonStkd			234					**234**
PP	287		2,627	3,029	3,071	2,815	507	**12,336**
PP-NC						10		**10**
SUBALP			20	80	51	79	46	**276**
WL/DF	163		341	1,302	3,475	1,448	1,975	**8,704**
WWP			234		47	113	100	**494**
Total	**756**	**483**	**4,686**	**6,549**	**9,216**	**5,451**	**3,408**	**30,549**

5. Flower Creek (project area) Age Classification Distribution

Table 4: Displays the estimated age class distribution for the Flower Creek project area from SLI observations.

Table 4: Flower Creek Project Age Class Distribution by Current Cover Type

	00 - 39	40 – 99	100 – 149	150 +	**Total**
HW			22		**22**
LP		8			**8**
MC		14	181	25	**220**
PP		57			**57**
WL/DF		82	149	36	**267**
WWP	67				**67**
Total	**67**	**161**	**352**	**61**	**641**

6. Old Growth

In Historical Vegetation of Montana under Age Structure of Natural Stands it is noted that, "The final category (150+ years) represents a pool of acres of old aged trees, a portion of which may be considered old growth stands. The actual acres which may be considered old growth are somewhat elusive in that our understanding of the concept of old growth is limited and not rigidly defined by nature." It is recognized that stand age is an important criteria for determining old growth but would not realistically determine old growth acreage if used as the sole parameter. The Northern Region USFS publicized their effort to characterize old growth forest communities by cover type in a 1992 Internal Report: *Old-Growth forest Types of the Northern Region,* by P. Green, J. Joy, D. Sirucek, W. Hann, A. Zack, and B. Naumann.

As per the State Land Board's decision in February, 2001, the DNRC adopted definitions for old growth by cover types, based on minimum number and size of large trees per acre and age of those trees as noted in *Old-Growth Forest Types Of The Northern Region.* Older stands within proposed project areas would be assessed for determining actual acreage that meet DNRC's old growth definitions. Old growth will be managed to meet biodiversity and fiduciary objectives in the SFLMP, pursuant to state law and the Forest Management rules, ARM 36.11.401 through 36.11.450.

No stands within the project area met the criteria for DNRC's old growth definitions.

7. Flower Creek Stand Characteristics

Stand characteristics helpful in describing existing stand conditions are summarized below in Table 6.

Table 6: General Stand Characteristics for Flower Creek Project Area.

Stand #	Acres	Current – Desired FC	Habitat Type	Stocking BFBA	Structure	Species Composition
1	129.3	MC - PP	THSE/CLUN	160	Multi	GF4,C3,D2,L1
2	25.5	MC - PP	THSE/ARNU	100	Multi	D4,L2,S1,P1
3	128.3	WL/DF - PP	THPL/ARNU	120	Multi	D4,L3,LP2,GF0
4	78.1	WL/DF - WWP	ABGR/LIBO	100	Multi	D5,L3,LP2
5	13.7	MC=	THPL/ARNU	40	Multi	D3,S3,LP2,C1
6	7.7	LP - PP	ABGR/LIBO	10	Two	LP6,D2,L1,WP0
7	16.3	WL/DF - PP	THPL/ARNU	100	Multi	D4,L3,LP2LGF1
8	52.4	MC	THPL/ARNU	60	Multi	S4,C4,GF2,L1
9	86.0	WWP	THPL/ARNU	0	Single	LP4,WP3,L1,D0
10	19.8	WL/DF	THPL/ARNU	120	Multi	D4,L3,GF1,S1
11	11.7	WL/DF - WWP	THPL/ARNU	120	Multi	L5,D3,GF1,WP0
12	56.2	PP	PSME/VACA	60	Multi	D3,BP3,L3,LP1
13	19.2	PP=	PICEA/EQAR	30	Multi	A9,S1

Harvest activities will be taking place in stands that are shade in the table. Current – Desired FC: this column shows current and appropriate cover types are the same if followed by = sign. Stocking: BFBA = board foot per acre divided by the square feet of basal area per acre in trees 9" or greater in diameter at breast height. Structure: single represents even-aged, single storied stands; Multi represents 2 or 3 storied stands with even aged patches of various age classes. Species composition: A=subalpine fir, BP=immature ponderosa pine, C=western redcedar, D=Douglas-fir, GF=grand fir, L=western larch, LP=lodgepole pine, WP=white pine. Following numbers estimate percent of species compositions in the overstory, where 0 is less that 10% and 8 would represent 80 to 89%

8. Flower Creek stand health and vigor

Overall stand vigor is rated as "poor" for the stands and acreage in this section. Salvage efforts have been made to capture the value of dead and dying grand fir, Douglas-fir, and western larch. Outbreaks of the Douglas-fir beetle (*Dendroctunus pseudotsugae*), Fir Engraver beetle (*Scolytus ventralis*), Dwarf mistletoe (*Arceuthobium douglasii & Arceuthobium laricis*), and root rots have and continue to negatively affect stand health and vigor.

9. Adjacent Lands' general forest conditions

Private industrial timberlands border this section to the west. US Forest Service lands border this land to the south. Small private ownership borders this section's north and east sides. The private industrial land west of the project area was logged in 2006, the USFS has had little management activity history. The small private ownership has been converted to residential dwellings, grazing pastures and a golf course.

B. Sensitive, Threatened, and Endangered Plants – existing condition

A review of the records from the Montana Natural Heritage Program indicated no plant species of special concern identified with the project area. In August of 2005 John Pierce completed a plant survey of the project area confirming an absence of sensitive, threatened, or endangered plant species within the project area.

C. Noxious Weeds – existing condition

Lincoln County and DNRC have a "Cooperative Integrated Noxious Weed Management Agreement" in compliance with the state law known as the County Weed Control Act (Section 7-22-2151, MCA). An annual coordination meeting between the county Weed Control District and DNRC allows for identification of weed problems; and determines an integrated approach at managing and treating priority areas as related to county and DNRC weed control goals.

At the landscape level, past activities have had a big impact on noxious weed populations. Land use activities such as logging, road building, livestock grazing, wildfires, and recreation have led to increases in the amount and distribution of noxious weeds on the Libby Unit. This has occurred at the project level as well. In the county tansy ragwort and rush skeletonweed has

been identified as a target control species. These species have not been observed within the project area. Spotted knapweed and hawkweed has been observed along road edges of the project area.

D. Effects Project Actions:

1. Proposed Project Actions:

a.) Harvest/Logging:

Unit 1: 27 acres	Seedtree harvest with ground base logging equipment
Unit 2: 54 acres	Seedtree harvest with ground base logging equipment
Unit 3: 48 acres	Seedtree harvest with ground base logging equipment
Unit 4: 223 acres	Seedtree harvest with ground base logging equipment
Unit 5: 79 acres	Selection harvest in the SMZ

b.) Roads:

~.75 mile of new road construction
~.25 mile of temporary road that will be reclaimed at the conclusion of the sale
~.75 mile of existing road that needs to be reconstructed to meet BMP standards
~.75 mile of existing road that needs to be reconditioned to meet BMP standards

c.) After harvest treatments:

Units 1, 2, 3 & 4: Slash will be treated other means than burning i.e. chipped, hog fuel, hauled away, buried or masticated, machine scarify units, full plant with PP and WWP.
Units 5: Lop and scatter fuel concentrations within the SMZ.

d.) Silvicultural treatment requirements for implementation:

Units 1, 2, 3 & 4: leave 10-15 trees per acre favoring PP, WL, WWP & DF
Unit 5: selected mark trees will be harvested

2. Effects on Cover Type and Age Class Distribution:

a.) Direct and Indirect Effects

1. *NO ACTION:* Short term effects are not anticipated with the no action alternative. In the long term, the general trend of increasing percentages of shade tolerant species in stand species composition would continue without disturbance-increasing the acreage of Mixed Conifer and Douglas-fir cover types and moving the project area further away from desired future condition cover types. Fuel loading would be expected to increase and stands would become more susceptible to a stand replacement fire.

2. *ACTION ALTERNATIVE:* Harvesting according the silvicultural prescriptions would result in the conversion of approximately 300 acres to the appropriate PP cover type (refer to Tables 1 & 2). New road construction would remove approximately 3 acres out of timber production.

b.) Cumulative Effects:

1. *NO ACTION ALTERNATIVE*: Without disturbance, the no action alternative would allow the trend of increasing acreages and densities of shade tolerant species to continue. The number of acres with desirable seral species would continue to decline.

2. *ACTION ALTERNATIVE*: Since the project area comprises approximately 2% of the Libby Unit landscape the magnitude of effects would be minimal. The action alternative would contribute to moving stand conditions towards more historical condition by decreasing the excess of MC cover type acres by ~300 acres and returning those acres to the historical PP, WWP cover types. The action alternative would increase the proportion of forested acres in the 0-39 year age class on state lands with the conversion of approximately 300 acres from older age classes.

3. Effects on other forest stand characteristics, health and vigor

a.) Direct and Indirect Effects:

1. *NO ACTION ALTERNATIVE*: Forest stands would continue to grow and develop without disturbance. Growth rates are likely to decline or become static without density control, and stand susceptibility to insects and disease would increase. Defect from stem decays in grand fir and western larch would slowly affect currently infected trees and spread to other trees, decreasing timber yield potential. Overall stand vigor would decline slowly as trees age and mature. Tree regeneration in canopy gaps or under poorly stocked upper canopies would be dominated by shade tolerant species, further diminishing the proportion of ponderosa pine in stand compositions

2. *ACTION ALTERNATIVE*: Under this alternative 431 acres would be managed. Of which 79 acres would be selectively harvested in the SMZ and would continue to represent the stand that currently exists. The remaining 352 acres would be harvested leaving seed trees and snags. This harvest would be a stand replacing treatment where PP and WWP would be planted. The action would result in an improved health and vigor of the stand and a reduction of fuels. The less desirable climax species that currently occupy the site would be replaced with more desirable seral species, thus promoting more historic species compositions.

b.) Cumulative Effects:

1. *NO ACTION ALTERNATIVE*: Forest stands within this section would continue to develop, retaining a larger proportion of the surrounding landscape in older, denser forest stands.

2. *ACTION ALTERNATIVE*: 431 acres would receive silvicultural treatments, increasing the acreage of open canopied forest and young, newly

established forest in the surrounding landscape. On 352 acres, treatment would provide conditions promoting development of future stands with more historic stand characteristics.

4. Effects on Noxious Weeds:

a.) Direct and Indirect Effects:

1. *NO ACTION ALTERNATIVE:* Ground disturbing activities associated with timber harvesting and road maintenance or construction would not occur. Populations of spotted knapweed and Hawkweed will increase in size and distribution along roads. As weed control priorities and funding allows under County Cooperative Weed Control Agreements, spaying along roads may occur within the next 5 years to contain or decrease existing weed populations.

2. *ACTION ALTERNATIVE:* Timber harvesting and road construction and maintenance activities will expose mineral soil and promote encroachment and spread of noxious weeds into the forest stands. In order to control and minimize the risk of increasing noxious weed populations, contract clauses would require the timber sale purchaser to: apply grass seed on areas with soil exposed from road construction or maintenance activities; wash and clean off-road equipment so it is free of weed parts and have it inspected prior to moving onto site; and, incorporate slash into skid trails or apply grass seed to heavily used trails that have soil exposed. Given sufficient funding, DNRC would have haul roads sprayed with herbicides prior to logging activities and after the completion of sale activities.

b.) Cumulative Effects:

1. *NO ACTION ALTERNATIVE:* Current noxious weed populations would continue to spread or new weed populations would invade the general area at the current rate given continuance of road and land uses.

2. *ACTION ALTERNATIVE:* The risk of additional noxious weed encroachment or invasion is higher under the alternative. Mitigations discussed above have been effective in containing or controlling noxious weed populations.

Flower Creek Environmental Assessment
Wildlife Resources

INTRODUCTION

This analysis is designed to disclose the existing condition of the wildlife resources and display the anticipated effects that may result from each alternative of this proposal. During the initial scoping, the following wildlife issues were identified from internal and external comments regarding the effects of proposed timber harvesting:

- Timber harvesting could reduce mature forested cover and alter landscape connectivity, affecting those wildlife species requiring these habitats.
- Recruitment of large-sized snags and coarse woody debris could be altered with timber harvesting, affecting a host of wildlife species requiring these deadwood resources.
- Timber harvesting could alter habitats for threatened and endangered wildlife species and/or alter their movements through the vicinity.
- Timber harvesting and associated activities could reduce fisher habitat availability and quality by reducing canopy cover, snag density, and the amount of course woody debris.
- Timber harvesting and associated activities could remove canopy cover and snags needed by pileated woodpeckers to forage and nest and/or displace nesting pileated woodpeckers from active nests, resulting in increased mortality to pileated woodpecker chicks.
- Timber harvesting and associated activities could enhance flammulated owl habitat by reducing canopy closure and increasing tree spacing, but could remove snags needed by flammulated owls for nesting.
- Big game security habitat and winter range could be affected by timber harvesting and associated road building.

The following sections disclose the anticipated indirect, direct and cumulative effects to these wildlife resources in the analysis area from the proposed actions. Past, current, and future planned activities on all ownerships within each analysis area have been taken into account for the cumulative effects analysis.

ANALYSIS AREA

In this section the discussions will focus on 2 areas of different scale. The first will be the “project area”, which consists of the state managed portion of section 16 in T30N R31W. The parcel ranges from 2,320 to 3,040 feet elevation and is largely on a northeastern aspect with slopes of varying steepness. The parcel is dominated by Douglas-fir/western larch and mixed conifer habitats with lesser amounts of ponderosa pine, lodgepole pine, and aspen. The second scale or the “analysis area” relates to the surrounding landscape for assessing cumulative effects. The scales of these analysis areas vary according to the species being discussed, but generally approximate the size of the home range of the discussed species.

ANALYSIS METHODS

DNRC attempts to promote biodiversity by taking a ‘coarse-filter approach’, which favors an appropriate mix of stand structures and compositions on State lands (ARM 36.11.404). Appropriate stand structures are based on ecological characteristics (e.g., land type, habitat type, disturbance regime, unique characteristics). A coarse-filter approach assumes that if landscape patterns and processes are maintained similar to those with which the species evolved, the full complement of species would persist and biodiversity would be maintained. This coarse-filter approach supports diverse wildlife populations by managing for a variety of forest structures and compositions that approximate historic conditions across the landscape. DNRC cannot assure that the coarse-filter approach will adequately address the full range of biodiversity; therefore, DNRC also employs a "fine-filter" approach for threatened, endangered, and sensitive species (ARM 36.11.406). The fine-filter approach focuses on a single species’ habitat requirements.

To assess the existing condition of the proposed project area and surrounding landscape, a variety of techniques were used. Field visits, scientific literature, SLI data, aerial photographs, Montana Natural Heritage Program data, and consultations with other professionals provided information for the following discussion and effects analysis. Specialized methodologies are discussed under the species in which they

occur. Species were dismissed from further analysis if habitat did not exist in the project area or would not be modified by any alternative.

COARSE FILTER ANALYSIS

Of the 108 mammal species known for the state, 71 are suspected or known to occur in Lincoln County (Foresman 2001). The majority of terrestrial vertebrates that were present at the time of European settlement likely still occur in the vicinity of the proposed project area. Eight amphibian and eight reptile species have also been documented in Lincoln County (Maxell et al. 2003) and at least 118 species of birds have been documented in the vicinity in the last 10 years (Lenard et al. 2003). Terrestrial species that rely on special habitat elements, such as white bark pine (*Pinus albicaulis*), western white pine (*Pinus monticola*), or burned areas, may not be present or occur in lower abundance due to the decline of these elements across the landscape. Over time, due to fire suppression, tree densities have increased and shade-tolerant species, such as Douglas-fir and subalpine fir have become more prevalent than they were historically. These departures probably benefit wildlife species that rely on shade-tolerant tree species and/or closed-canopy habitats, while negatively affecting species that rely on shade-intolerant tree species and/or open habitats.

Mature Forested Habitats and Landscape Connectivity

Issue: Timber harvesting could reduce mature forested cover and alter landscape connectivity, affecting those wildlife species requiring these habitats.

A variety of wildlife species rely upon mature to old stands for some or all life requirements. A partial list of these species includes pileated woodpeckers (*Dryocopus pileatus)*, American marten (*Martes americana*), brown creepers (*Certhia americana)*, and winter wrens (*Troglodytes troglodytes*). The proposed project area currently contains approximately 413 acres of mature stands (100+ years in age) of reasonably closed canopy western larch/Douglas-fir and mixed conifers.

Wildlife species that require connectivity of forest habitat types between patches or those species that are dependent upon interior forest conditions can be sensitive to the amount and spatial configuration of appropriate habitats. Some species are adapted to thrive near patch edges, while others are adversely affected by the presence of edge or the other animals that prosper in edge habitats. Connectivity of forested habitats facilitates movements of those species that avoid non-forested areas and other openings; connectivity under historical fire regimes likely remained relatively high as fire differentially burned various habitats across the landscape. Today, the mosaic of ownership and diversity of past management within the general vicinity of the project area have compromised connectivity and forest-interior habitats to a degree. Forested habitats in the project area are only partially connected to other forested patches in the vicinity. Management on adjacent parcels has largely compromised connectivity, however the forested habitats adjoin similar habitats to the south on USFS and DNRC managed lands.

Cumulative effects were analyzed on the 8 surrounding sections (totaling approx 5,811 acres) using field evaluations and aerial photograph interpretation. Factors considered within the analysis area include the level of harvesting, amount of densely forested habitats, and connectivity. Presently a large portion of the analysis area (approximately 60%) is not in mature, forested conditions due to residential clearing and other past harvesting. Existing and regenerating forested stands are largely dominated by western larch/Douglas-fir, ponderosa pine and mixed conifers. Human developments are common on the private ownerships in the northeast portion of the analysis area. This parcel is on edge of the town of Libby, and as such, may be providing a buffer from the town for those species that require extensive, forested habitats, but likely provides little in terms of connectivity between forested habitats. Additionally, connectivity has been compromised by the differing ownerships and management regimes in the analysis area. Potential barriers to wildlife movements in the analysis area include agricultural areas and human developments.

Direct and Indirect Effects to Wildlife Species due to Changes in Mature Forested Habitats and Connectivity

No Action Alternative

Forest conditions would continue to age and move toward denser stands of shade-tolerant tree species with high canopy cover. Individual trees and possibly pockets would continue to die and create openings where younger trees could become established. Largely, no appreciable changes to forest age, the distribution of dense forested cover, or landscape connectivity would be anticipated. No changes in wildlife use would be expected; wildlife favoring dense stands of shade-tolerant tree species would benefit, while those requiring conditions likely found under natural disturbance regimes would continue to be underrepresented. Habitats for species that require younger stands would continue to decline with the advances in succession within the units harvested 20+ years ago. Habitat for forested interior species and old-stand-associated species, such as the American marten, northern goshawk, and pileated woodpecker, would likely improve with this alternative; however western larch and ponderosa pine (preferred snag species) would decline in abundance over time. Thus, no direct or indirect effects would be anticipated to mature forested habitats and connectivity.

Action Alternative
Approximately 429 acres of western larch/Douglas-fir and mixed conifers would be largely removed on the state parcel. These conditions would lead to younger, more open stands, which could interrupt movement by species requiring extensive, connected forested habitats. However, this parcel is on edge of the town of Libby, and as such, may be providing a buffer from the town for those species that require extensive, forested habitats, but likely provides little in terms of connectivity between forested habitats. The changes in stand age and density with the proposed harvesting would likely reduce habitats for species associated with old stands, such as American marten and pileated woodpeckers, which have benefited from the increasing stand ages and densities caused by modern fire suppression. In general, habitat conditions would improve for species adapted to the more open forest condition, while declining for species that prefer dense, mature forest conditions. Thus, moderate direct or indirect effects to mature forested habitats and connectivity would be anticipated.

Cumulative Effects to Wildlife Species due to Changes in Mature Forested Habitats and Connectivity

No Action Alternative
The surrounding landscape is a mosaic of ownerships subject to a host of management regimes. Past harvesting has reduced the amount of the analysis area in mature, forested habitats. With this alternative, stands on the state parcel would continue to contribute to the mature forested stands in the analysis area. Additionally, stands in the analysis area that have been harvested in the last 30 years will start developing mature forest stand characteristics through time. No appreciable changes to amount of mature, forested habitats, level of harvesting, or connectivity would be anticipated. Continued use of the analysis area by species favoring dense stands of shade-tolerant tree species and those species requiring larger areas of mature forests would be expected. Limited habitat for old-stand-associated species, such as the American marten and pileated woodpecker, would likely persist. Thus, no direct or indirect effects would be anticipated to mature forested habitats and connectivity.

Action Alternative
Diverse ownership patterns and management regimes within the analysis area have created a mosaic of habitat conditions in the analysis area. Past harvesting has reduced mature forest stands within the analysis area and proposed of approximately 429 acres would decrease the amount of the analysis area in mature forested habitats from 2,340 (40%) acres to 1,908 (33%) acres. Some of the stands on adjacent parcels would continue maturing and move into the mature, forested class in the future. Thus minor effects to the amount of mature, forested habitats present would be anticipated. Since the parcel is more likely to be serving as a buffer from the human development in the town of Libby and not likely providing landscape connectivity facilitating wildlife travel, the proposed harvesting would have marginal effects on landscape connectivity. Wildlife species favoring dense stands of shade-tolerant tree species and those species requiring larger areas of mature forests would see a reduction in available habitat while species favoring earlier seral stage habitats would see an increase in available habitats. Habitats for old-stand-associated species would be further reduced in the analysis area. Thus, minor cumulative effects to mature forested habitats and connectivity would be anticipated.

Snags and Coarse Woody Debris
Issue: Recruitment of large-sized snags and coarse woody debris could be altered with timber harvesting, affecting a host of wildlife species requiring these deadwood resources.

Snags and coarse woody debris are important components of the forested ecosystems. Five primary functions of deadwood in the forested ecosystems are: 1) increase structural diversity, 2) alter canopy microenvironment, 3) promote biological diversity, 4) provide important habitat for wildlife, and 5) act as a storehouse for nutrient and organic matter recycling agents (Parks and Shaw 1996). Snags and defective trees (partially dead, spike top, broken top) are used by a wide variety of wildlife species for nesting, denning, roosting, feeding, and cover. Snags and defective trees may be the most valuable individual component of Northern Rocky Mountain forests for wildlife species (Heijl and Woods 1991). The quantity, quality, and distribution of snags affect the presence and population size of many of these species. Larger diameter, taller snags tend to provide nesting sites, while shorter snags and stumps tend to provide feeding sites for a variety of birds and mammals.

Coarse woody debris provides food sources, areas with stable temperatures and moisture, shelter from the environment, lookout areas, and food storage sites for several wildlife species. Small mammals, such as red-backed voles (*Clethrionomys gapperi*), to large mammals, such as black bears (*Ursus americana*), rely on deadwood for survival and reproduction. The size, length, decay, and distribution of woody debris affect their capacity to meet these life requisites. Logs less than 6 feet in length tend to dry out and provide limited habitat for wildlife species. Single scattered downed trees could provide lookout and travel sites for squirrels or access under the snow for small mammals and weasels, while log piles provide foraging sites for weasels and denning sites for Canada lynx.

During field visits, 0-6 variably spaced snags per acre and differing quantities of coarse woody debris were observed in the project area. The snags and coarse woody debris in the project area exhibit the range of sizes and decay classes, ranging from small to large and sound to almost fully decayed.

Cumulative effects were analyzed on the 8 surrounding sections (totaling approx 5,811 acres) using field evaluations and aerial photograph interpretation. Factors considered within the analysis area include the level of harvesting, number of snags and coarse woody debris, and risk level of firewood harvesting. The ownership pattern in the surrounding landscape is a mosaic consisting of small private owners, Plum Creek Timber Company lands, along with lands managed by USFS and DNRC. Within the cumulative effects analysis area, past harvesting and forest product gathering has limited snag and coarse woody debris densities in much of the area. Portions of the analysis area are not highly accessible and/or have not been harvested in the recent past, thus snags and coarse woody debris levels in these areas are slightly above the levels exhibited across the rest of the analysis area.

Direct and Indirect Effects on Snags and Coarse Woody Debris

No Action Alternative
No direct changes in the deadwood resources would be expected. Snags would continue to provide wildlife habitats and new snags would be recruited as trees die. However, in the long-term, densities of shade-intolerant trees and resulting snags would decline as these species are replaced by increasing numbers of shade-tolerant species. Shade-intolerant species tend to provide important habitats, such as nesting structures and foraging habitats, for cavity nesting birds. Coarse woody debris would persist without other disturbances influencing distribution and quality. Continued decay and decline in existing snags and trees would continue to contribute to the coarse woody debris in the project area. Thus, no direct or indirect effects would be anticipated to snags and coarse woody debris.

Action Alternative
Present and future deadwood material would be reduced during the timber harvesting. Several snags and snag recruits would be planned for retention within the proposed units. However, some of this material could be lost due to safety and operational concerns. Based on data collected by the USFS on the Lolo National Forest, an estimate of snag loss during harvest activities ranged from 50-100% (Hillis 1993). Recent DNRC monitoring indicates similar loss of snags, with a greater percentage being lost in the

medium size classes than other size classes. Snag loss could continue after the project, especially along the open road and property boundaries, although these zones largely lack appreciable snag numbers due to legal and illegal firewood and forest product gathering. Future snag quality would be enhanced with silvicultural prescriptions that should lead to the re-establishment of western larch and ponderosa pine across much of the project area. Given the range of variability in sizes and decay classes of snags and coarse woody debris present in the project area, prescriptions aiming to maintain a variety of these resources would benefit the suite of species that rely on these habitat components. Thus, moderate direct or indirect effects to snags and coarse woody debris would be anticipated.

Cumulative Effects on Snags and Coarse Woody Debris

No Action Alternative
Snags and coarse woody debris would not be altered in the project area. The species composition of future snags could be altered with changing species composition within the stands due to advances in succession. Snags have been retained during some of the past harvesting on adjacent ownerships. However, firewood gathering and forest product harvesting in the vicinity has also reduced these deadwood resources. Snags and coarse woody debris are largely absent from the non-forested habitats in the analysis area. Wildlife relying on snags and coarse woody debris would be expected to persist across the analysis area. Thus, no cumulative effects to snags and coarse woody debris would be anticipated.

Action Alternative
Under this alternative, snags and coarse woody debris would be reduced within the project area. Surrounding lands have under gone different management regimes by the differing landowners over time, and within each of these management regimes, snags and coarse woody debris have received different levels of consideration; however, harvesting on all ownerships in the vicinity has reduced these deadwood resources. Additionally, firewood and forest product gathering in the vicinity has also reduced these deadwood resources near the open roads and skid trails. The losses of snags and coarse woody debris under this alternative would be additive to the previous harvests in the area. Thus, minor cumulative effects to snags and coarse woody debris would be anticipated.

FINE FILTER ANALYSIS
Threatened and Endangered Species
Issue: Timber harvesting could alter habitats for threatened and endangered wildlife species and/or alter their movements through the vicinity.

Four species indigenous to Montana are classified as “threatened’ or “endangered” under the Endangered Species Act of 1973. The bald eagle, grizzly bear, and Canada lynx are listed as "threatened," while the gray wolf is listed as “endangered.”

- **Bald eagle *(Haliaeetus leucocephalus)***

The project area is 4 miles south of the nearest known bald eagle nest at Pipe Creek and is separated from the nest by areas of unsuitable habitats. Thus, due to the distance between the nest and project area and habitats present, extensive use by bald eagles would not be expected. Therefore, direct, indirect, and cumulative effects to bald eagles would be minimal under both alternatives and this species will not be discussed further.

- **Gray wolf (*Canus lupus*)**

The Wolf Prairie wolf pack occupies an area centered approximately 26 air miles east of the project area and has been documented as close as 24 miles from the project area. No known den or rendezvous sites are known in the vicinity, however landscape features frequently associated with these sites exist in the vicinity of the project area. Deer and elk, the primary prey species of wolves in Montana, are known to use the proposed project area for most of the year. Wolves could pass through the area at any time, however little use is anticipated due to the proximity to the town of Libby and the current distribution of wolves in the area. Since wolves are not using the project area and important wolf habitats (denning and rendezvous sites) would not be affected, no direct, indirect, or cumulative effects would be expected under either alternative and this species will not be discussed further.

•**Grizzly bear (*Ursus arctos*)**
Grizzly bears are wide-ranging mammals that use forested upland habitats. Preferred grizzly bear habitats are meadows, riparian zones, avalanche chutes, subalpine forests, and big game winter ranges, all of which provide seasonal food sources. The proposed project is located 1.5 miles east of the Cabinet-Yaak Grizzly Bear Recovery Zone (USFWS 1993) and is outside of the "occupied habitat" area as mapped by grizzly bear researchers and managers to address increased sightings and encounters of grizzly bears in habitats outside of recovery zones (T. Wittinger, Unpublished Interagency Map). Although grizzly bears could show up in the project area at any time, extensive use is unlikely given the high levels of human development and disturbance and marginal grizzly bear habitat values existing in the project area. Thus, no direct, indirect, or cumulative effects would be expected under either alternative and this species will not be discussed further.

•**Canada lynx (*Lynx canadensis*)**
Canada lynx are associated with subalpine fir forests, generally between 4,000 to 7,000 feet in elevation in western Montana (Ruediger et al. 2000). The proposed project area ranges from approximately 2,320 to 3,040 feet in elevation. The parcel is dominated by Douglas-fir/ western larch and mixed conifers. Primary lynx habitats are subalpine-fir types with abundant coarse woody debris for denning; however, lynx will use a mix of species compositions (subalpine fir, lodgepole pine, Douglas-fir, grand fir, and western larch). Lynx generally forage in young coniferous forests with plentiful snowshoe hares. Mature, densely forested cover facilitates movement and provides habitats for red squirrels, which are an alternative prey source for lynx. Since the project area is low elevation and comprised of stands not typically used by lynx, lynx are not expected to use the area. Therefore, direct, indirect, and cumulative effects to Canada lynx would not be expected as a result of either alternative and this species will not be discussed further.

Sensitive Species
When conducting forest-management activities, DNRC gives special consideration to habitat requirements of several sensitive species. These species are sensitive to human activities, have special habitat requirements that might be altered by timber management, or might become listed under the Federal Endangered Species Act if management activities result in continued adverse impacts. Because sensitive species usually have specific habitat requirements, consideration of their needs serves as a useful "fine filter" for ensuring that the primary goal of maintaining healthy and diverse forests is met.

A search of the Montana Natural Heritage (MNH) database documented Townsend's big-eared bat within 3 miles of the project area. Table W-2 shows how each sensitive species was either included in the following analysis or was removed from further analysis due to habitat availability.

TABLE W-2 – LISTED SENSITIVE SPECIES FOR THE NWLO SHOWING THE STATUS OF THESE SPECIES IN RELATION TO THIS PROPOSED PROJECT

SPECIES	DETERMINATION – BASIS
Black-backed woodpecker	No further analysis conducted – No recently (less than 5 years) burned areas are in the project area. Thus, no direct, indirect or cumulative effects to black-backed woodpeckers would be expected to occur as a result of either alternative.
Coeur d'Alene salamander	No further analysis conducted – No moist talus or streamside talus habitat occurs in the project area. Thus, no direct, indirect or cumulative effects to Coeur d'Alene salamanders would be expected to occur as a result of either alternative.
Columbian sharp-tailed grouse	No further analysis conducted – No suitable grassland communities occur in the project area. Thus, no direct, indirect or cumulative effects to Columbian sharp-tailed grouse would be expected to occur as a result of either alternative.
Common loon	No further analysis conducted – No suitable lake habitats occur within the project area. Thus, no direct, indirect or cumulative effects to common loons would be expected to occur as a result of either alternative.
Fisher	**Included** –Suitable low elevation riparian areas with high canopy closure occur within the project area.

Flammulated owl	**Included** –Limited dry ponderosa pine habitats occur within the project area.
Harlequin duck	No further analysis conducted – No suitable high-gradient stream or river habitats occur in the project area. No direct, indirect or cumulative effects to harlequin ducks would be expected to occur as a result of either alternative.
Northern bog lemming	No further analysis conducted – No suitable sphagnum bogs or fens occur in the project area. Thus, no direct, indirect or cumulative effects to northern bog lemmings would be expected to occur as a result of either alternative.
Peregrine falcon	No further analysis conducted – No suitable cliffs/rock outcrops occur in the project area. Thus, no direct, indirect or cumulative effects to Peregrine falcons are anticipated as a result of either alternative.
Pileated woodpecker	**Included** – Western larch-Douglas-fir and limited ponderosa pine habitats occur in the project area that could provide foraging and nesting habitats.
Townsend's big-eared bat	No further analysis conducted –No suitable caves or mine tunnels are known to occur in the project area. Thus, no direct, indirect or cumulative effects to Townsend's big-eared bats are anticipated as a result of either alternative.

Sensitive species assessed:

•**Fisher *(Martes pennanti)***
Issue: There is concern that timber harvesting and associated activities could reduce fisher habitat availability and quality by reducing canopy cover, snag density, and the amount of course woody debris.

The fisher is a medium-sized mammal belonging to the weasel family that uses mature and late-successional habitats, particularly for resting and natal dens. Fishers are generalist predators and use a variety of habitat-types, but are disproportionately found in stands with dense canopies. In the Rocky Mountains, fishers appear to prefer late-successional moist coniferous forests (Jones 1991). Such areas typically contain large live trees, snags, and logs, which are used for resting and denning sites and dense canopy cover, which would be important for snow intercept (Jones 1991). Fishers have also been noted to avoid large openings, non-forested habitats, and shrub-seedling stands. Forest-management considerations for fisher involve providing for resting and denning habitats near riparian areas while maintaining a network of travel corridors.

The project area ranges from 2,320 to 3,040 feet in elevation, with 1 perennial and a couple of intermittent streams. Some potential fisher denning habitats exist along the streams in the project area. The uplands on this section are dominated by western larch/Douglas-fir and mixed conifers, which could be suitable fisher denning, foraging, or travel habitats. Areas of western white pine, ponderosa pine, and hardwoods exist in the project area and are not considered fisher habitats.

Trapping is a significant source of fisher mortality. Fishers are easily caught in traps set for martens, bobcats, and coyotes (Powell and Zielinski 1994), and trapping density is generally tied to road density. Currently, limited open road access likely reduces potential trapping pressure and firewood gathering.

Cumulative effects were analyzed on Flower, Lower Libby Creek, and portions of Middle Kootenai River (east of Parmenter Creek and south of the Kootenai River) watersheds (totaling approx 45,485 acres) using field evaluations and aerial photograph interpretation. Factors considered within the analysis area include the level of human disturbance and harvesting, amount of densely forested habitats, and connectivity along riparian habitats. Presently a sizeable amount of the analysis area is not likely providing fisher habitats due to residential clearing and other past harvesting, however extensive forested areas do exist in the analysis area. Some riparian areas exist within the analysis area, however landscape connectivity is limited in the vicinity due to past harvesting, residential clearing, and other non habitats. Several open roads in the analysis area likely provide human disturbance and potential trapping pressure.

Direct and Indirect Effects on Fishers

No Action Alternative
No direct effects to fishers would be expected. Habitats that are conducive to fisher denning and travel may improve due to increased tree growth and canopy closure; however, foraging opportunities may decline due to the lack of diversity in habitat such as edge and younger age-class stands. Human disturbance and potential trapping mortality would expect to remain similar to current levels. Thus, no direct or indirect effects to fisher would be anticipated.

Action Alternative
Roughly 4 acres of riparian fisher habitats would be included in the regeneration-type treatments and another 25 acres would be harvested with a selection harvest method designed to meet the SMZ law. The result would either be a reduction in habitat quality or loss of habitat on 25 acres in addition to the loss of riparian habitat included in regeneration-type treatments. Fisher foraging and resting habitat would be reduced due to the proposed harvesting of the overstory in the uplands (approximately 352 acres). No long-term changes in human disturbance or potential trapping mortality would be anticipated with this alternative. Thus, minor direct or indirect effects to fisher would be anticipated.

Cumulative Effects on Fishers

No Action Alternative
Fisher denning, foraging, and travel habitats would be retained. Suitable fisher denning habitat appears somewhat limited within the analysis area. Uplands within the analysis area are largely Douglas-fir/western larch, ponderosa pine, and mixed conifers which include areas that are not conducive to fisher use. No changes to existing fisher habitats or landscape connectivity would be anticipated with this alternative. Road access within the analysis area would not be changed with this alternative; therefore, fisher vulnerability to trapping would remain unchanged. Thus, no further cumulative effects to fisher habitats or disturbance levels would be anticipated.

Action Alternative
Up to 24 acres of potential riparian fisher habitats could be harvested, and therefore removed from available fisher habitats until the stand matures again into the sawtimber stocking class. Since proposed harvesting would meet SMZ law requirements, portions of these riparian habitats could still be suitable after the proposed treatment. At the cumulative effects analysis area level, harvesting would reduce available riparian fisher habitats from 104 acres (82%) to 80 acres (78%), which exceeds the 75% threshold established with ARM 36.11.440(1)(b)(i). This would be a liberal estimate of the habitat loss, and depending upon the resulting stand canopy closure, the net loss of fisher habitats may be appreciably less. Additionally 352 acres of potential fisher foraging and travel habitats in the uplands would be harvested in varying amounts. These reductions would be additive to the losses associated with past timber harvesting in the cumulative effects analysis area. Landscape connectivity would not be appreciably altered with the proposed harvesting, and would continue to somewhat limited in the analysis area. Human disturbance and potential trapping mortality would remain relatively unchanged since no changes in access within the subunit would be realized. Thus, minor cumulative effects to fisher habitats and/or disturbance levels would be anticipated.

•**Pileated woodpecker** ***(Dryocopus pileatus)***
Issue: There is concern that timber harvesting and associated activities could remove canopy cover and snags needed by pileated woodpeckers to forage and nest and/or displace nesting pileated woodpeckers from active nests, resulting in increased mortality to pileated woodpecker chicks.

Pileated woodpeckers excavate the largest cavities of any woodpecker. The cavities are frequently used in subsequent years by many other species of birds and mammals. Preferred nest trees are western larch, ponderosa pine, black cottonwood, and quaking aspen, usually 20 inches dbh and larger. Pileated woodpeckers primarily eat insects, mainly carpenter ants, which inhabit stumps, snags, and large downed logs. Nesting habitat for pileated woodpeckers consists of mature stands generally below 5,000 feet in elevation with 100 to 125 square feet per acre of basal area and a relatively closed canopy (Aney and

McClelland 1985). The feeding- and nesting-habitat requirements, including large snags or decayed trees for nesting and large downed wood for feeding, closely tie these woodpeckers to mature forests. Pileated woodpeckers appear to be positively correlated with the amount of dead and/or dying wood in a landscape (McClelland 1979).

The project area ranges from 2,320 to 3,040 feet in elevation and is dominated by Douglas-fir/western larch and mixed conifers, with lesser amounts of ponderosa pine, lodgepole pine, and aspen. During field visits, several feeding sites and 0 to 6 (12+ in dbh) variably spaced snags per acre were observed in the proposed project area along with similar numbers of smaller snags that could serve as foraging sites. Potential pileated woodpecker nesting habitats exists on 211 acres within the project area. Additionally, roughly 355 acres of sawtimber-sized stands exist in the project area that likely serve as foraging habitats.

Cumulative effects were analyzed on the 8 surrounding sections (totaling approx 5,811 acres) using field evaluations and aerial photograph interpretation. Factors considered within the analysis area included the degree of harvesting and the amount of continuous forest within the analysis area. Presently a large portion of the analysis area (approximately 60%) is not likely providing pileated woodpecker habitats due to residential clearing and other past harvesting. The forested habitats in the analysis area are largely concentrated in the southern portion of the analysis area, which is adjacent to more continuous forested habitats.

Direct and Indirect Effects on Pileated Woodpeckers

No Action Alternative
No direct effects would be anticipated under this alternative. Western larch, Douglas-fir, ponderosa pine, and western red cedar would continue to grow and die over time, providing nesting and foraging habitat. As these trees die, replacement shade-intolerant trees would be underrepresented in the stand unless other disturbances influence the stands, allowing for their regeneration. Therefore, a reduction in suitable nesting trees would be likely over time. Thus, habitat sustainability and quality for pileated woodpeckers would gradually increase through time, and then decline. However, the proposed project area alone would not be expected to be capable of supporting a pair of pileated woodpeckers in the near-term. Thus, no direct or indirect effects to pileated woodpeckers would be anticipated.

Action Alternative
Pileated woodpeckers tend to be tolerant of human activities (Bull and Jackson 1995), but could be temporarily displaced by the proposed harvesting and road-building activities. Elements of the forest structure important for nesting pileated woodpeckers would be retained, including snags, coarse woody debris, numerous leave trees, and snag recruits. Realistically, however, some snags would likely be removed due to safety and/or logistical concerns, which further affects pileated woodpeckers now and into the future. After the proposed harvesting, the 429 harvested acres within the project area would be largely too open to be considered pileated woodpecker habitat. The silvicultural prescriptions would retain healthy western larch, ponderosa pine, and, to a lesser degree, Douglas-fir and promote regeneration of these same species. Retention and recruitment of western larch and ponderosa pine would benefit pileated woodpeckers in the future by providing nesting, roosting, and foraging habitats. However, the proposed project area alone would not be expected to be capable of supporting a pair of pileated woodpeckers in the near-term. Thus, moderate direct or indirect effects to pileated woodpeckers would be anticipated.

Cumulative Effects on Pileated Woodpeckers

No Action Alternative
Western larch, ponderosa pine, and Douglas-fir trees would continue to grow and die over time in the proposed project area, providing nesting and foraging habitats. Through time, conversion of stands to shade-tolerant species would reduce nesting substrates for pileated woodpeckers. Approximately 2,353 acres (40%) of the 5,811 acres in the analysis area are presently in mature ponderosa pine, Douglas-fir/western larch, and mixed conifer cover types that provide nesting and foraging habitats for pileated woodpeckers. Much of the remaining acreage in the analysis area is in non-forested types or were harvested in the last 20-30 years and do not possess qualities that make them highly suitable for pileated

woodpecker nesting or foraging, although small patches of habitats exist in some of these areas. Thus, minor cumulative effects to pileated woodpeckers would be anticipated.

Action Alternative
Reductions in pileated woodpecker habitat would be expected. Some existing snags, coarse woody debris, and suitable nesting trees would be retained within the proposed project area. However, the 429 acres included in proposed units would largely be too open for appreciable pileated woodpecker use after harvesting. This reduction would reduce mature, forested habitats within the analysis area to approximately 1,908 acres (33%) and be additive to the past losses associated with timber harvesting and clearing that has occurred in the analysis area. Within those stands harvested in the last 30 years mature, future foraging habitat is, however, developing and may be suitable in the next 30-50 years. Since 1-2 pairs of pileated woodpecker s could continue to use the analysis area, minor cumulative effects would be anticipated.

•Flammulated Owl *(Otus flammeolus)*
Issue: There is concern that timber harvesting and associated activities could enhance flammulated owl habitat by reducing canopy closure and increasing tree spacing, but could remove snags needed by flammulated owls for nesting.

Flammulated owls are tiny, migratory, insectivorous forest owls that inhabit old, open stands of warm-dry ponderosa pine and cool-dry Douglas-fir forests in the western United States and are secondary cavity nesters. They usually nest in cavities excavated by pileated woodpeckers or northern flickers in 12-25" dbh aspen, ponderosa pine, or Douglas-fir. Without disturbance, Douglas-fir encroach upon ponderosa pine stands, increasing stand density and resulting in decreased habitat quality for flammulated owls. Although the stands in the project area are largely western larch/Douglas-fir and mixed conifers, some ponderosa pine is a component of many of the stands and most of the stands are more appropriately ponderosa pine types. The current conditions may be a result of the encroachment by Douglas-fir in the past. During field visits, 0-6 sizeable (>14" dbh) snags/acre were observed in the project area.

Cumulative effects were analyzed on the 8 surrounding sections (totaling approx. 5,811 acres) using a combination of field evaluation and aerial photograph interpretation. Factors considered within the analysis area included the amount of open, mature stands of ponderosa pine and amount of dense, mixed conifer stands. In the analysis area, much of the area (roughly 60%) has been harvested in the recent past, which in many cases, removed the large tree structure needed by flammulated owls. Additionally, modern fire suppression has allowed Douglas-fir in-growth to create denser stands of ponderosa pine and Douglas-fir in portions of the analysis area, which has reduced habitat quality for flammulated owls. Therefore, the amount of habitat for flammulated owls in the analysis area is relatively low.

Direct and Indirect Effects on Flammulated owls

No Action Alternative
Much of the project area is densely forested with few openings, therefore these areas are poor quality flammulated owl habitats, and no changes to habitat quality or quantity in the project area would be expected. In the long term, stands once dominated by ponderosa pine would continue to be converted to Douglas-fir stands through succession, become densely stocked, and exist at high risk to insects, disease and stand-replacement fire. Therefore, habitat sustainability and quality for flammulated owls would continue to decline. Thus, minor direct and indirect effects to flammulated owls would be anticipated.

Action Alternative
Flammulated owls are tolerant of human disturbance (McCallum 1994), however the elevated disturbance levels associated with harvesting could negatively impact flammulated owls should they be using existing habitat during the nesting period. Proposed timber harvest would open the canopy while favoring western larch and ponderosa pine. Elements of the forest structure important for nesting flammulated owls would be retained, including snags, coarse woody debris, numerous leave trees, and snag recruits. Realistically, however, some snags would likely be removed due to safety and/or logistical concerns, which further affects flammulated owls now and into the future. The more open stand conditions, the retention of fire

adapted tree species, and the maintenance of snags would move the proposed project area toward historical conditions, which is preferred flammulated owl habitat. After implementation, most of the stands on the 429 acres included in this alternative would be more open with an increasing percentage of ponderosa pine, which would result in minor positive benefits to flammulated owls. Thus, minor positive direct and indirect effects to flammulated owls would be anticipated.

Cumulative Effects on Flammulated owls

No Action Alternative
Poor quality flammulated owl habitat would persist in the state parcel. Portions of the analysis area have become increasingly dense and with a larger proportion of shade-tolerant species. Harvesting has occurred in the analysis area on roughly 3,470 acres in recent years, potentially improving flammulated owl habitats by creating foraging habitats and reversing a portion of the Douglas-fir encroachment, however retention of large ponderosa pine was not necessarily a consideration in many of these harvest units; thereby minimizing the benefits to flammulated owls. Thus, negligible cumulative effects to flammulated owls would be anticipated.

Action Alternative
Habitat would be enhanced through a reduction in encroaching Douglas-fir and other conifers while retaining mature ponderosa pine on approximately 429 acres. This would increase the amount of the analysis area that has been harvested in the recent past from 3,470 acres to 3,902 acres. However, the enhanced habitat created with this harvesting would not likely affect flammulated owl populations appreciably as habitat is somewhat limited throughout the larger analysis area. Habitats on adjacent parcels could gradually improve if the seed trees and retention trees are allowed to continue to grow and mature as the newly established stands mature, however it is unknown if management objectives for these parcels include open stands of large ponderosa pine. Thus, negligible positive cumulative effects on flammulated owls might be expected.

Big Game
•Elk (*Cervus elaphus)* Security
Issue: There is concern that timber harvesting and associated activities could remove elk security habitat and increase elk vulnerability.

The proposed project area falls within the hunting district 104. The hunting district is within the Lower Clark Fork Elk Management Unit (EMU), which covers approximately 2,896 square-miles (DFWP 2004). Moderate road densities facilitate hunter access to much of the unit.

Timber harvesting can increase elk vulnerability by changing the size, structure, juxtaposition, and accessibility of areas that provide security during hunting season (Hillis et al. 1991). As visibility and accessibility increase within forested landscapes, elk and deer have a greater probability of being observed and, subsequently, harvested by hunters. Because the female segments of the elk and deer populations are normally regulated carefully during hunting seasons, primary concerns are related to a substantial reduction of the male segment and subsequent decrease in hunter opportunity.

Dense, large (≥ 250 acres) forest patches at least ½ mile from an open road that would provide elk (and subsequently deer) security (Hillis et al. 1991) are absent from the state parcel; however a portion of the project area that is far enough from the open roads that could serve as security cover in conjunction with available habitat on adjacent ownerships. It is expected that when elk security is substantially compromised, effects to deer can also be expected (albeit to a lesser degree than for elk). Summer use of the proposed project area by deer and elk was documented during field visits.

Cumulative effects were analyzed on hunting district 104 (488,568 acres) using field evaluations and aerial photograph interpretation. Factors considered within the analysis area include amount of the analysis area recently harvested and the level of road access in the area. Much of the district is managed by USFS (74%), with much smaller private (12%) and Plum Creek Timber Company Lands (11%) components. DNRC parcels only make up 2% of the hunting district. The district is dominated by western

larch/Douglas-fir, ponderosa pine, and mixed conifers in the lower elevations. Upper elevations in the district are a mix of conifers, including mountain hemlock, subalpine fir, whitebark pine, lodgepole pine, and Engelmann spruce. Additionally, areas of regenerating forest are intermixed within this matrix of mature forests, and non-forested areas are common in some of the lower elevations. Reasonable vehicular and foot access to the analysis area exists on open and closed roads; however, there are also areas that lack road access.

Direct and Indirect Effects on Elk Security

No Action Alternative
No changes in elk security cover or hiding cover would be expected. Elk security would still be largely absent from the project area. No changes would be anticipated in disturbance and elk vulnerability due to hunting. Thus, no direct or indirect effects to elk security would be anticipated.

Action Alternative
By definition, no changes in elk security cover would be expected since much of the proposed project area would still remain within ½ mile of an open road, and that portion that is far enough away from the open road is too small to provide elk security habitat. Roughly 219 acres of the 236 acres in the state parcel that could be suitable elk security habitat would be harvested with this alternative. No changes in legal motorized access to the state parcel would be anticipated under this alternative, however the new roads proposed to be constructed and closed after use could facilitate an increase in foot traffic and illegal motorized vehicular traffic. Increased sight distances and the reduction in hiding cover may decrease big game survival in the project area. Thus, low-moderate direct or indirect effects to elk security would be anticipated.

Cumulative Effects on Elk Security

No Action Alternative
No changes would be anticipated in elk security cover, big game hiding cover, or hunter accessibility. Over time, recently harvested stands would mature and hiding cover would improve, but this would likely be partially offset by the reductions associated with ongoing harvesting. Temporal shifts in security cover in the analysis area can be expected as successional stages change, but long-term changes would not be expected. Human access on open and closed roads would persist. Thus, no cumulative effects to elk security would be anticipated.

Action Alternative
Increased sight distances could reduce big game survival. No appreciable changes in long-term elk security cover would be expected. Proposed road construction could facilitate an increase in foot traffic and illegal motorized vehicular traffic. Short-term reductions in hiding cover would be also expected with this alternative. Access in the analysis area is relatively easy given the amount of open roads and access points. Portions of the analysis area have been harvested, reducing hiding cover, but appreciable hiding cover exists within the analysis area. In general, minor cumulative effects to big game security cover, hiding cover, or survival at the analysis area level would be expected.

•Big Game Winter Range
Issue: There is concern that timber harvesting and associated activities could remove thermal cover on big game winter ranges, which could reduce carrying capacity of the winter range.

Winter ranges enable big game survival by minimizing the effects of severe winter weather conditions. Winter ranges tend to be relatively small areas that support large numbers of big game, which are widely distributed during the remainder of the year. These winter ranges have adequate midstory and overstory to reduce wind velocity and intercept snow, while moderating ambient temperatures. Besides providing a moderated climate, the snow-intercept capacity effectively lowers snow depths, which enables big game movement and access to forage. Snow depths differentially affect big game; deer are most affected, followed by elk, then moose.

Montana Department of Fish, Wildlife, and Parks identified approximately 579 acres of mule deer and elk winter range, and 346 acres of moose winter range in the project area. The winter ranges in the state section are parts of larger mule deer (12,452 acres), elk (12,452 acres), and moose (47,758 acres) winter ranges, respectively. In the past roughly 73 acres in each of these winter ranges has been harvested by DNRC and is not yet providing winter range attributes. Winter snow depths and suitable microclimates influence big game distribution and use within the vicinity. Mature Douglas-fir/western larch, ponderosa pine, and mixed conifer stands in the project area are providing attributes facilitating use by wintering big game. Proximity to human developments and open roads has likely slightly reduced winter range capacity of the winter range in the project area. Evidence of summer use by deer and elk was noted throughout the project area during field visits.

Cumulative effects were analyzed on the contiguous 12,452-acre elk winter range using a combination of field evaluation and aerial photograph interpretation. Factors considered within this analysis area include acres of winter range harvested and level of human disturbance and development. Presently, a variety of stands across the winter range are providing thermal cover and snow intercept for big game. Roughly 4,944 acres (40%) of the 12,452-acre elk winter range have been harvested in the last 30 years, likely limiting the usefulness of these acres for wintering big game. Human disturbance within the winter range is largely associated with the town of Libby, and additional disturbance to the winter range can be attributed to recreational snowmobile use, other forms of winter recreation, and commercial timber harvesting, likely influencing wintering elk.

Direct and Indirect Effects on Big Game Winter Range

No Action Alternative
Big game thermal cover in the project area would not be altered in the near term. In the longer-term, continued succession could reduce forage production while increasing thermal cover in these stands. Thus, no direct or indirect effects to big game winter range would be anticipated.

Action Alternative
Some displacement would be expected as a result of the proposed harvesting operations. This action alternative would reduce thermal cover for big game. Within the proposed units, 429 acres (74%) of the 579 acres of mule deer and elk winter range and 137 acres (40%) of the 346 acres of moose winter range would be harvested, largely eliminating habitat attributes enabling winter use by these big game species. Collectively with past harvesting, these reductions would result in approximately 86% of the elk and mule deer winter ranges and 61% of the moose winter range in the state parcel that would no longer be suitable as winter range. Some pockets of thermal cover would likely exist within these units after treatment, particularly within unit 5, where retention would be expected to be slightly heavier. Timber harvesting would not prevent big game movement through the area. Proposed harvesting could stimulate browse production for big game species. Thus, there would be moderate direct and indirect effects to big game winter range.

Cumulative Effects on Big Game Winter Range

No Action Alternative
No changes would be anticipated in thermal cover and snow intercept. Stands that are providing thermal cover would be expected to continue providing this resource under this alternative. Continued winter use of the larger winter range would be expected. Harvesting on private ownerships could continue to displace wintering big game and reduce available winter range habitats. Human disturbance levels would be anticipated to continue at similar levels, affecting wintering elk. Thus, there would be no cumulative effects to big game winter range as a result of this alternative.

Action Alternative
Thermal cover would be largely removed from approximately 429 acres of the elk winter range, which would increase the amount of the winter range that has been harvested from 4,944 acres to 5,376 acres (~43%); thus this reduction in thermal cover and snow intercept on winter range would be additive to ongoing and past reductions across the elk winter range. Portions of the winter range are expected to start

providing some habitat attributes suitable for winter big game use in the near future as they continue maturing with time. Displacement associated with this alternative could also be additive to the displacement associated with ongoing timber sales should activities be conducted during the winter. In addition to the direct displacement associated with harvesting, human disturbance levels could increase slightly with the increasing openness that could facilitate increased use. Besides the increase in use, the increases in sight distance associated with this disturbance may increase the distance any particular disturbance (including existing disturbances) affects big game wintering in the area. Thus, minor cumulative effects to big game winter range to would be anticipated.

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Suggested Wildlife Mitigations

- Cease all operations if a threatened or endangered species is encountered. Consult a DNRC biologist and develop additional mitigations that are consistent with the administrative rules for managing threatened and endangered species (ARM 36.11.428 through 36.11.435).

- Favor western larch and ponderosa pine in retention and regeneration decisions for pileated woodpecker and flammulated owl nesting and foraging habitats.

- Manage for snags, snag recruits, and coarse woody debris, particularly favoring western larch and ponderosa pine (ARM 36.11.439(1)(b)).

- Effectively close roads after the proposed activities to reduce the potential for unauthorized motor vehicle use and/or loss of snags to firewood gathering.

- Reduce views into harvest units along the open road where feasible using a combination of topography, group retention, roadside vegetation buffers, and retention of pockets of advanced regeneration.

- Prohibit contractors and purchasers conducting contract operations from carrying firearms while operating on restricted roads (ARM 36.11.432(1)(m)).

DNRC – Forest Management Bureau
2705 Spurgin Rd
Missoula, MT 59804

Memo

To: Tony Nelson, NWLO Hydrologist

From: Jim Bower, FMB Fish Biologist

CC: Doug Turman, Libby Unit Fire Supervisor

Date: 13 July 2007

Re: Flower Creek Timber Sale: Fisheries technical support for Tony Nelson

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On 21 May 2007 a field review of the Flower Creek Timber Sale area was conducted by the project ID team. I was asked to participate in this field review in order to provide Tony Nelson with fisheries technical support for MEPA analysis. The section reviewed was T30N R31W Sec16.

FLOWER CREEK

Flower Creek flows south to north through the E1/2 of the section and supports native fisheries, including bull trout, westslope cutthroat trout and sculpins, and nonnative fisheries such as eastern brook trout and stock rainbow trout. Since the proposed actions will not occur anywhere within 150' of Flower Creek, no measurable or detectable effects to that stream are expected to occur, and a field review of applicable physical variables was not conducted.

UNNAMED TRIB TO FLOWER CREEK

An unnamed tributary to Flower Creek flows west to east from the SW1/4 to the NE1/4 of the section, which was the focus of the fisheries assessment. At the time of the field review this stream conducted continuous flow throughout the section, and flows ranged from 0.1 to 0.5 CFS. No fish were visually observed on any reach of the stream throughout the section. Potential salmonid fisheries habitat is very poor; no wintering habitat was observed and potential spawning and rearing habitat was very limited and very poor quality. The average BFW is 2.0 feet, gradients range from 0.5 to 2.0%, typical substrates include 95% silts and 5% sands, and much of the channel flows through sedge meadows with a skunk cabbage component. During base flows this stream likely only conducts intermittent very low surface flows or no surface flows at all, which is likely the primary limiting variable for salmonid and sculpin species.

The unnamed tributary flows from Plum Creek lands west of Section 16. Plum Creek has indicated that the stream has not been identified as fish-bearing. A single water quality sample (during the field review) from the stream near the Plum Creek and state boundaries indicated the stream is nutrient poor and slightly acidic during peak seasonal flows.

Based on these observations, this unnamed tributary should not be considered a fish-bearing stream.

Attachment G: Summary of Mitigations Incorporated in the Action Alternative

Soil Resource Mitigations:

1. In order to prevent soil resource impacts, ground based mechanical felling or yarding are restricted to periods when one or more of the following conditions occur:
   a. Soil moisture content at 4" depth less than 20% oven-dry weight.
   b. Minimum frost depth of 3.
   c. Minimum snow depth of 18 inches, loose, or 8 inches, packed.
2. Slash would be retained and distributed on site to contribute nutrients to the soil.
3. Coarse woody debris would be retained on site for maintaining soil productivity.
4. Slash would be trampled and incorporated into skid trails for erosion control.
5. Slopes in excess of 45% would be avoided during skidding or skid with skyline or helicopter logging systems.

Water Resource Mitigations:

1. Streamside Management Zones (SMZs) 50 to 100 feet in width (dependant on slope and benches) would be marked along all streams. Harvesting would be minimal within the SMZs.
2. Road surface drainage and erosion control features would be added or improved on existing roads and installed as part of the road construction to reduce erosion rates and reduce the risk of sediment delivery.
3. Grass seed and fertilizer would be applied to newly disturbed culvert installation sites and road cuts and fills to stabilize erodable slopes and minimize sediment production.
4. Temporary roads would be reclaimed after harvest activities are complete.

Vegetation Resource Mitigations:

1. Larger diameter snags will be protected as needed to assure retention of 2 snags per acre in all units.
2. Ponderosa pine, western larch, western white pine and Douglas-fir would be favored leave trees in all canopy levels.
3. All trees infected with dwarf mistletoe and blister rust would be removed.
4. To deter further establishment of noxious weeds along roads, grass seed and fertilizer would be applied to areas with soil exposed during road construction and maintenance activities.
5. To minimize noxious weed invasion away from roads, "off road" logging equipment would be inspected and required to be free of weed parts prior to moving onto the site.
6. Grass seed would be applied or slash incorporated into heavily used trails with bare soil exposed to limit establishment of noxious weeds.

Wildlife Resource Mitigations:

1. Should an eagle next or wolf rendezvous site be observed within one mile of the project area, all operations would be suspended until consultation with a DNRC biologist provided appropriate mitigations.
2. Security for big game would be provided by maintaining the closure of roads to recreational motorized use after harvest is completed.
3. Public access would continue to be restricted to reduce potential loss of residual snags to firewood gathering.
4. Minimal harvest activities in the SMZs would retain patches of heavy forest cover for structural diversity and connectivity through ownerships.